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A MODERN THREE-QUARTER VENEER CROWN

By Charles Peterka, D.D.S., Minneapolis, Minn.

THE ideal bridge abutment is one that is conservative, yet sufficiently retentive; one that is restorative in function, and yet esthetic. It must render immunity without excessive destruction of tooth structure, preserve the health of the investing tissue and, above all, not endanger the vitality of the tooth.

The anterior three-quarter veneer crown more often meets the foregoing requisites than any other type of attachment we have today. Because it fulfils these requirements so readily, particularly in esthetics, it is the retainer most frequently indicated and most often used on anterior abutments. There is no other type of attachment that furnishes so much retention with so little tooth destruction and pulp encroachment. The three-quarter veneer crown may not be the ideal of tomorrow, but it is the ideal of today. It is not the universal, but it is the most frequently indicated attachment that we have at our disposal at the present time.

Before discussing the preparation and its steps, let us consider the types of teeth that we encounter. An examination of a mouth taken at random will show that, generally speaking, there are three classes of tooth form: the square, the ovoid and the tapering type. We also know that these teeth will be long, medium or short. The square or ovoid tooth is usually the bulky type with a heavy cingulum and thick incisal edge, possessing sufficient supporting dentin between the labial and lingual enamel plates. The tapering tooth is readily recognized by its name, incisal translucency and lack of bulk.

A full understanding of the three-quarter veneer abutment makes it quite apparent that the square or ovoid tooth is the most desirable for this type of attachment. Not that the tapering tooth cannot be used in the same manner, but often modifications have to be made.

The technic of making the anterior three-quarter veneer crown consists of six definite steps. If the tooth is in contact on both proximal surfaces, a lightning disk or strip is used, with no injury to the approximating teeth. This severance of contact is not considered as one

Read before the Section on Partial Denture Prosthesis at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

of the steps in the preparation, but merely as a preparatory procedure.

The first true step in the preparation is the mesial and distal proximal cut. These cuts are made with a thin carborundum disk, which cuts away the mesial and distal portions of the tooth, making the axial walls nearly parallel, but slightly converging from the gingival border to the incisal edge. The disk should be held at such an angle that the cut is made at the expense of the lingual rather than the labial surface, thereby leaving intact, as nearly as possible, the full mesial-distal width of the labial surface. This cut is carried gingivally just beyond the free gum margin. If the initial cuts are made accurately, the esthetic effect of the finished crown is practically assured. (Figs. 1, 2 and 3.)

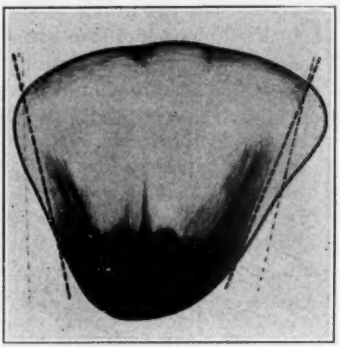

Fig. 1.—Incisal view of upper anterior tooth. Dark lines indicate the correct position of mesial and distal cuts. The mesial and the distal diameter of the tooth are reduced very slightly, which assures a good appearance.

The second step consists in the removal of enough from the lingual surface to allow space for a sufficient thickness of metal, usually about 1 mm. Figure 1 shows this cut extending from the height of the cingulum instead of from the crest of the free gum margin, and terminating on the incisal edge; more frictional-wall retention thus being obtained later. A small wheel carborundum stone about one-fourth inch in diameter is used for this cut. (Fig. 4.)

The third step, cutting the incisal bevel, can be carried out with the stone used for cutting the lingual surface. This bevel is made to protect the incisal edge of the tooth, and the cutting is again done at the expense of the lingual rather than the labial incisal edge. This procedure makes it possible, in most cases, to protect the incisal edge which is to receive the greatest stress of incision, without showing any gold, or showing very little.

The fourth is the incisal step, which is started with a small inverted cone or knife-edge stone (Fig. 4) 2 or 3 mm. in diameter at its cutting edge. Either the straight handpiece or the contra-angle may be used. Undermining the labial plate of enamel will result in not only a weakening of the preparation, but also, in the finished product, an unsightly discoloration of the incisal border. This step is finished with an inverted cone bur, No. 39 or 40. The cone bur is followed with a medium garnet sandpaper disk one-half inch in diameter, to finish the step labially, to establish an adequate incisal bevel and to remove all unsupported enamel rods. Some bevel is directed lingually to increase the possibility for greater use of gold at the point where it is most needed in incising. Let me

Fig. 2.—Proximal extent of cut.

repeat that care must be taken to place this step in dentin, without weakening the labial enamel plate. When dealing with a tapering type of tooth, it is generally impossible to use this step safely. In such cases, it is not used because it cannot be placed advantageously and nothing would be added to the retention of the restoration. This step should be eliminated entirely on these weak teeth. (Fig. 5.)

Supplementary retention can be used on the lingual surface at the point of fusion of the mesial and distal marginal ridges. A platinum pin, gage 20 to 24, is used for the auxiliary retention. When this type of retention is used, it must parallel the mesial and distal retention

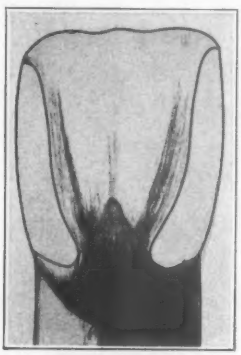

Fig. 3.—Lingual and gingival extension.

form, for obvious reasons. (Figs. 6 and 7.)

The fifth is perhaps the most difficult step. It naturally follows the previous step because the incisal groove acts as a guide for the starting point of the mesial and distal retention forms or grooves. These grooves are started with a cross-cut fissure bur, No. 700 or 700 L. They are extended to a point just beyond the margin of the first cut and are generally parallel to the labial surface, although their direction may vary, depending on the alinement of the other abutment teeth. The grooves also must be placed as near the labial margin as possible not to undermine the labial-axial plate of enamel. The depth should be sufficient for adequate retention, usually about the diameter of the bur or about 0.75 to 1 mm.

With this positioning, we obtain the longest groove possible, assure maximum retention and do not endanger the pulp. Now, with a medium garnet sandpaper disk, one-half to five-eighths inches in diameter, the mesial and distal cavo-surface margins are established by beveling from almost the depth of the retention grooves toward the labial margins. A No. 15 chisel or the small Wedelstaedt chisel is used to finish these margins subgingivally. The lingual side of the groove

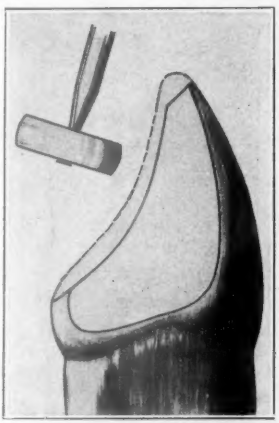

Fig. 4.—Extent of cut on lingual surface, from height of cingulum and terminating on incisal edge; showing incisal bevel.

is not beveled the same as the labial side, but is trimmed slightly with either disks or chisels to eliminate sharp corners, which are hard to reproduce in the impression or wax pattern. Beveling the surface toward the labial side of each groove gives greater bulk of metal and makes direct waxing or verification of wax patterns easier.

To gain the greatest retention from this attachment, the mesial and distal walls should converge very slightly toward the incisal, and the grooves should be as

nearly parallel as possible. For greater depth or to correct convergence, a square fissure bur, No. 556, can be used. In this case, however, the groove should end in a definite shoulder or step toward the gingival margin, which should be a little short of the gingival margin established previously. The resultant retentive form simulates a staple or horseshoe, which is the key retention form obtained in this attachment. (Fig. 8.)

The sixth step consists in removing the lingual surface area around the cingulum, ending in a definite edge or margin just beneath the free gum margin. The bulky portion is removed with a small barrel-shaped carborundum stone followed by a pear-shaped or tapering stone. (Fig. 9.) For maximum retention, this portion of the lingual surface is made as nearly parallel to the lateral retention grooves as possible.

Fig. 5.—Incisal step. The labial plate of enamel should never be undermined.

The preparation is now finished on all its surfaces with sandpaper disks of various grits.

As factors in the successful production of three-quarter veneer crowns suitable for fixed bridge retainers, the following have been suggested:

1. Maximum retention with minimum destruction of tooth structure.
2. Preservation of tooth vitality.
3. Pleasing appearance.
4. Maintenance of healthy investing tissues.

It is well to keep in mind the correlation between parallelism in the abutment preparation and retention. The greater the taper, the less the retention. A tapering abutment preparation will retain the abutment only as long as the cementing medium will hold it.

Let me repeat that the incisal step is not always necessary. It can be omitted quite safely if the tooth which is used as an abutment is long or if a short-span bridge is being constructed. If the omission of this step reduces the entire retention form to the point of inadequacy, auxiliary lingual retention should be used. In most cases, this compensates for the omission of this step. Those of us who have had occasion to remove restorations with pin anchorages will appreciate the strength gained in this manner. This incisal step should never be used on teeth with thin incisal edges. In such cases,

Fig. 6.—Mesial and distal retention forms, started at angle formed by incisal step. The relative position as regards the labial surface and gingival extension is to be noted.

it may be necessary to use a double abutment. In doing this, an unhealthy condition may be created. This may be avoided if the solder joint is kept as near the incisal edge as possible, and the space below the solder joint is enlarged to enable the patient to properly stimulate this tissue.

The preparation on the lower anterior teeth is the same as that on the upper teeth, with this exception: Where the occlusion is such that the labial-incisal surface shows wear or is under heavy stress, the incisal step must be reversed so that the lingual wall of the step projects over the labial wall of the incisal step. The objection to this procedure is the unsightly display of gold in the finished restoration.

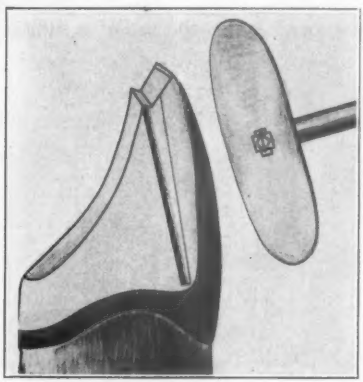

Fig. 7.—Labial bevel of axial retention forms. A definite gingival bevel is formed, eliminating the butt joint at the end of the groove.

Erroneously, some operators believe that the three-quarter veneer crown is indicated for anterior abutments only. This idea may prevail among a few because, from an esthetic standpoint, it serves the purpose better than any other type of restoration. They prefer the inlay or full veneer crown in the posterior region. Undoubtedly, either of the latter can be used in nearly all cases in which the three-quarter veneer crown can be used.

Personal observation and clinical experience with all types of bridge abutments demonstrate the inlay to be the poorest type as regards retentive and lasting values.

The full veneer gold crown is that type of abutment which affords a maximum of retention from a mechanical standpoint. Our modern concept, however, renders this abutment practically useless if intended for the restoration of lost anterior segments of the dental arches, or where esthetic considerations play a major rôle.

The three-quarter veneer crown, used where indicated and properly constructed, offers a means of suitable retention, along with its esthetic possibilities. The intelligent and conscientious operator will, therefore, use each type of retainer where it is most suitable.

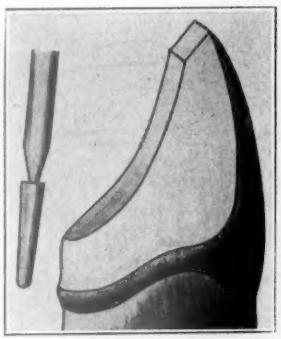

Fig. 8.—Formation of definite linguogingival margin.

Modern fixed bridgework is not a mere question of filling spaces. It is a question of restoring normal function in the lost area by means of abutments that will maintain healthy investing tissues with as little tooth destruction and as little fear of subsequent pulp involvement as possible.

The posterior three-quarter veneer crown is indicated where:

1. The maximum retention obtained with a full veneer crown is not necessary.

2. Decay has not weakened or disintegrated the buccal enamel wall.

3. It will restore functional occlusion, contact and contour.

4. Decay is not so rampant that sufficient immunity would not be established unless a full veneer crown were used.

This veneer crown covers the mesial, distal, lingual and occlusal surfaces, leaving the entire buccal surface intact; that is, with the exception of the buccoclusal bevel.

In older patients, where wear is quite apparent, the buccal cusp should always be covered with metal to protect worn cusps and insure protection and immunity. While this tends toward a greater display of metal, if it is carefully executed, esthetic values of a high degree can still be maintained.

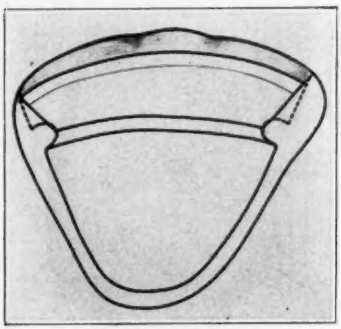

Fig. 9.—"Staple-shaped" retention form obtained by union of mesial and distal grooves with incisal step. The preparation supplies maximum retention with minimum tooth destruction and a pleasing appearance.

The steps for the preparation of the posterior three-quarter veneer crown follow quite closely those for the anterior three-quarter veneer crown. (Fig. 12.)

The first step in this preparation is made with a thin, safe-sided carborundum disk, three-fourths to seven-eighths inch in diameter. If there is contact, it is first relieved with a metal lightning disk, to enable the operator to pass a safe-sided carborundum disk through without injury to the enamel of the proximal tooth. With the carborundum disk, the mesial and distal sides are cut away so that these sides converge slightly toward the occlusal surface, starting from a line beneath the gum tissue, and carried far enough lingually so that the preparation can be continued with small carborundum stones. (Fig. 13.)

In the second step, the lingual surface area is removed so that it is made slightly conical from the gingival outline of the tooth toward the occlusal. A No. 6 stone or a slightly larger one is used, depending on the size of the tooth. It is not necessary to remove all of the enamel on this surface, if undercut areas are eliminated.

The third step consists of removal from the occlusal surface of enough tooth structure to insure the use of a sufficient bulk of metal to permit of normal functional tooth form and proper articulation in the metal crown. This is done with various sizes and shapes of stones, conveniently following the natural contour of the occlusal surface of the tooth. Usually, about 1 mm. in its entirety is ground off, following the general contours of the occlusal surface. The occlusal surface should not be ground in two-plane surfaces as formerly done in banded, capped and cast crowns. Such grinding is ruthless tooth destruction, resulting in pulp irritation and other difficulties.

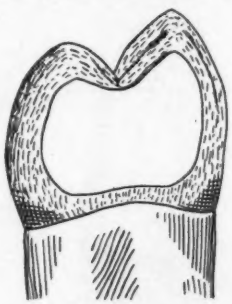

Fig. 10.—Proximal cut of upper bicuspid; showing gingival and lingual extension.

Fourth, the occlusal step is established. This is comparable to the making of the

incisal step in the anterior tooth. On the upper posterior tooth, and that is what I am considering, this step is made just buccally to the central groove or in the central groove. (Fig. 12.)

With a No. 701 tapered cross-cut fissure bur, we design the mesial and distal retention forms, using the occlusal step as a guide. These grooves are made parallel to the long axis of the tooth and parallel to each other and just buccally to the junction of the buccal and middle third. They are carried gingivally to the first cut. The depth corresponds to about the diameter of the bur. Variance of the relationship of these grooves is indicated to parallel other abutments. The grooves are then beveled with medium garnet disks or chisels, as was done for the anterior abutment, from almost the depth of the groove buccally, insuring definite margins. These bevels are brought out buccally far enough to insure an area of immunity, and to make the margins accessible for waxing and later on for finishing the casting to the margins. (Fig. 13.)

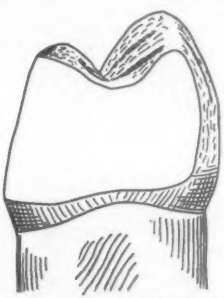

Fig. 11.—Lingual cut, forming continuous plane with mesial and distal cuts.

The lingual side of the groove is trimmed slightly with either disks or chisels to eliminate sharp corners, for reasons already stated. In beveling these grooves, the buccal margin is lengthened slightly beyond the gingival extension of the original groove made with a tapering bur, and a gingival bevel is thus established. At this time, the grooves should be deepened with a cylindrical bur, cross-cut fissure bur No. 556 or 557, to the point which is considered to afford adequate retention, usually 1 mm. or the depth of the bur. Near parallelism is established in this procedure. Now, the proper occlusal bevel is established with sandpaper disks. All unsupported enamel rods are removed, for obvious reasons.

In the sixth and last step, the entire preparation is finished with sandpaper disks.

To gain the greatest strength from this attachment, the mesial and distal walls should just slightly converge toward the occlusal surface, and the retention grooves should be as nearly parallel as possible.

When there is a filling or a cavity in the tooth, a boxlike retention form similar to that of a mesioclusodistal inlay can be used instead of the retention grooves described above. In such cases, this bulkier type of retention form is clearly indicated because it does not involve tooth destruction further than that which has already occurred. Furthermore, it is not advisable to place these grooves in a filling material formerly used to restore a part of a broken down tooth. If at all possible, these retention forms should be placed in sound tooth structure rather than in cement or other filling materials. (Figs. 14 and 15.)

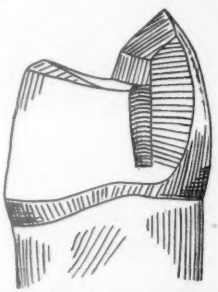

Fig. 12.—Occlusal step, similar to incisal step on anterior abutment preparation. The position is slightly buccal to the central groove or in the central groove.

May I state that the three-quarter or partial veneer crown is not a panacea for all crown and bridge abutments, but it has elevated the art of restoring lost teeth by means of fixed bridgework to the high plane it enjoys today.

Let us now consider the procedure of obtaining wax patterns. We have advocates of all three methods: the direct, the indirect-direct and the indirect. No doubt any one of these, by virtue of individual perfection, can be successful in the hands of certain operators.

There are advantages and disadvantages in all three methods. It is therefore advisable to use the method which best meets our requirements and assures the best results.

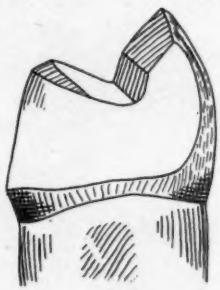

Fig. 13.—Mesial and distal retention forms, parallel to long axis of tooth and to each other and buccal to the junction of the buccal and middle third of tooth. The depth should be about 1 mm. or the diameter of the bur. It must be remembered that the direction of grooves may vary to coordinate with other abutment teeth. The subgingival bevel extends beyond the end of the groove.

I find the direct and the indirect-direct methods most satisfactory. Of these, I prefer the direct method whenever and wherever possible, because it reduces to a minimum any possible chance for error.

The direct method seems difficult and complicated to many operators; and yet, if carefully planned and tried, it is not at all difficult. Many dentists avoid this technic, because they have never tried it or have not pursued it long enough to master the technic. Most of us can and will use this technic on being convinced that it will definitely produce superior results and that it is a time saver. With but little additional time over that required to take the impression, a wax pattern can be obtained and an appointment saved. In fact, the additional time required for this will not be so great as, or at least not greater than, the time consumed to properly invest the impression and to pack the die. Remember that after the die hardens, it must be properly prepared, and the wax pattern must be carved to margins and

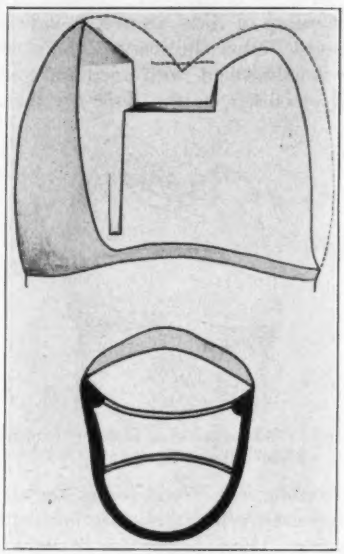

Fig. 14.—Slight proportionate tooth destruction.

contour before it is ready for investing. Then, if we are using the indirect-direct method, the wax pattern must be verified; which, of course, means an additional appointment with the patient.

The greater accuracy of the direct method can be readily appreciated on realization that so many teeth with attachments are so exactly bell-shaped that it is impossible to take accurate impressions with the materials available today.

It is true that many of the extremely tapering prepared areas can be handled accurately by means of a die. However, the majority of these cannot be accurately reproduced through the medium of a die. Patients today are more esthetic than ever before. They will not tolerate any unusual display of gold. The esthetic restoration demands little more cutting of axial surfaces than severance at the contact. It is impossible to reproduce this abutment preparation accurately by means of a die. So much for the direct method of obtaining wax patterns. Let us now consider the actual procedures.

In this paper, I shall treat of the making of the wax pattern for the anterior three-quarter veneer crown. It is this wax pattern, which so many operators are afraid to handle in this manner, that can be carved so easily directly on the tooth.

An aluminum band slightly larger than one used in taking an impression is selected to allow for excessive contour and thereby facilitate burnishing and carving. The band is now contoured at the gingival portion so that, when seated, it extends uniformly and slightly beyond the gingival margin of the prepared area. The labiogingival portion is cut out to expose all areas forming an undercut. Then enough of the incisolingual portion of the band is cut away to permit the patient to close to centric occlusion when

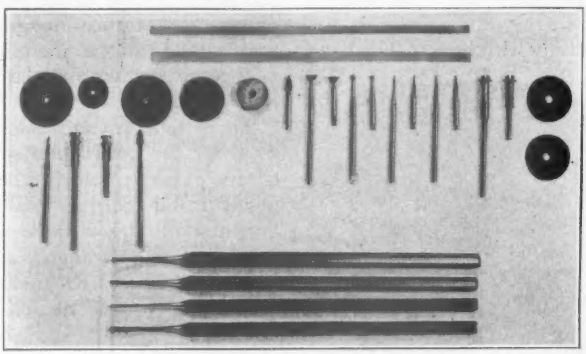

Fig. 15.—Suggested armamentarium.

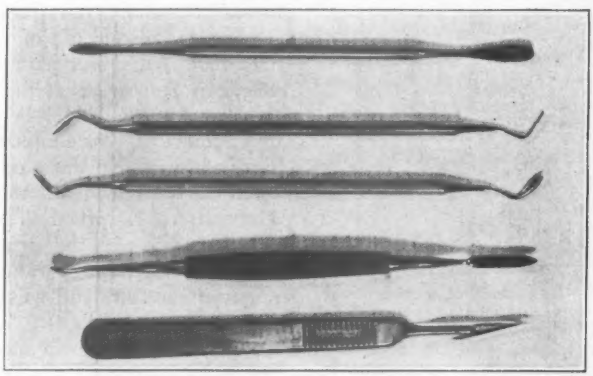

Fig. 17.—Suggested wax instruments.

the band is in position. The inside of the band is now lubricated and filled with softened wax. The gingival portion of the wax is pooled, the band is pushed to place and the patient is instructed to close firmly.

This wax impression is allowed to congeal and the excess wax on the lingual surface is removed with a lance or wax carver. While still in position, the labial incisal strip of the band is slit with a sharp lance and the wax impression and band are carefully withdrawn. The band

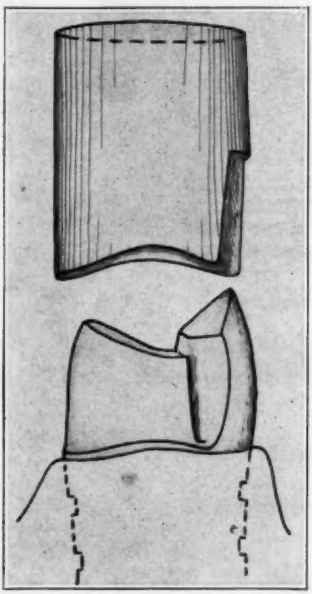

Fig. 16.—Uniformity of contour.

is carefully peeled off as the wax pattern is held by its incisal bulk. With a sharp lance, the gingival excess of wax to the gingival margin is removed. Some operators prefer to mount the pattern temporarily on a wedge-shaped bur and then remove this excess with a coarse garnet disk, revolving the disk away from the margin.

Now the wax pattern is replaced and is firmly and completely encircled with a linen or silk strip. In this secure position, the lingual carving is executed. The previous bite registration and the adjacent teeth afford adequate guidance for this procedure. With the strip still in position, the subgingivolingual and interproximal margins are reburnished with a warm wax carver.

At this time, the strip is removed, the excess incisal wax is cut down with the lance and the incisal margin is burnished and carved. The excess wax is softened on the cavosurface margins, burnished and carved to the margins. Next the labiogingival interproximal margins are reburnished.

There remains only one more procedure for the completion of the carving of this pattern; namely, the lingual subgingival and interproximal marginal reburnishing. This is done with a No. 3 wax carver. The lingual surface of the wax pattern can be smoothed with a pledget of cotton treated with oil of cajeput.

All of the carving is now complete and the wax pattern is ready for removal. Some operators prefer to do the carving by means of an explorer and then mount the wax pattern. I believe that it is best to insert the sprue while the wax pattern is still in position and thus remove it. To eliminate any possibility of spreading, the wax pattern may again be encircled with the linen strip. The pattern is sprued lingually to the incisal margin with the sprue pin parallel to the grooves of preparation. It is now removed carefully and wax added as indicated.

By the indirect-direct method, assuming that a satisfactory die of either amalgam or stone has been made, we proceed to take the correct bite of the abutment tooth. This is accomplished with a band slightly larger than the one used to take the impression, to allow for excessive contour and to facilitate carving. The band is contoured in the manner one would obtain the impression of the abutment, with the exception that the occlu-

sal part of the band or matrix is cut away sufficiently to permit the patient to close to contact and make lateral registrations. The inside of the band is then lubricated, filled with soft warm wax and carried onto the abutment.

The patient is now directed to close and all mandibular registrations are reproduced. The wax is allowed to congeal and is then removed from the tooth. This wax form is then placed on the lubricated die and carving to proper contour and occlusal marking is completed, with an excess or bulk of wax on the cavosurface margins. The wax pattern is transferred to the abutment, which is kept free of moisture by means of cotton rolls. With a silk tape or linen strip, the pattern is completely and tightly encircled and held firmly in place with finger pressure on the occlusal or linguoincisal surface. The excess or slight bulk of wax on all visible cavosurface margins is burnished and carved to exact margins.

The strip is reapplied and the pattern held firmly in place. In this position, the subgingival lingual and interproximal margins are reburnished with a warm wax instrument. The wax pattern is removed by the preferred method and examined for imperfections that can still be corrected; the pattern washed with a spray of water at room temperature, and wax added for contact. On insertion, a sprue former should enter any wax pattern at such a point that all of the pattern is ahead of or beyond the point of attachment.

The indirect method is preferred by many operators because it reduces the amount of chair time for both the patient and the operator. Assistants can be so well trained that they can, from an accurate impression and wax bite, obtain satisfactory castings. Because this method is a chair-time saver, and because, in the hands of many advocates of the indirect method, some very fine work is being done, this method deserves consideration.

In this technic, however, we must bear in mind two additional variables; namely, the material used in taking the impression and the material used in obtaining the die.

Of the materials employed in taking the impression, modeling compound is the one generally used. In checking its physical properties, we appreciate that it must be thoroughly chilled before its removal from the preparation. In taking a modeling compound impression of a preparation, the proper contouring of the band is the most important step. To overcome any distortion or fracture, the band must be so accurately contoured that it is not permitted to extend into areas of constriction or undercuts. A distorted or fractured impression, of course, is inaccurate and will result in the same kind of casting. (Fig. 16.)

In the past, silver amalgam or copper amalgam was most frequently used in the making of dies. Today, however, this practice has largely been replaced by the use of various hydrocoil materials. I shall not discuss these materials, but shall refer those interested to an article in THE JOURNAL, from the Bureau of Standards, on the physical properties of many of these materials.[1]

If we have an accurate die, the wax manipulation of the pattern is exactly the same as that of the indirect-direct method, except that the pattern is completed entirely on the die, and the casting is made to fit it. If the impression and die were accurate, the casting will fit the prepared tooth.

In closing, I wish to make an appeal for more conservative cutting of teeth and for greater attention to esthetics, which apply to the well-prepared three-quarter veneer crown. A spray of warm water should be used on the stones in preparing the abutments, much painful cutting and pulp irritation being thereby eliminated.[2]

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INTRAVENOUS ANESTHESIA FOR DENTAL SURGERY WITH SODIUM ETHYL (1-METHYLBUTYL) THIOBARBITURIC ACID

By ADRIAN O. HUBBELL,* D.D.S., and R. CHARLES ADAMS, M.D., Rochester, Minn.

THE intravenous administration of sodium ethyl (1-methylbutyl) thiobarbituric acid (pentothal sodium) has proved to be a valuable method of inducing general anesthesia for many of the surgical operations performed by the dentist. Its use is suggested as an alternative method of anesthesia in cases in which the patients might be difficult to manage under nitrous oxide-oxygen anesthesia and in those in which local anesthesia is not well tolerated. The co-operation of many dentists and anesthetists has largely overcome several of the obstacles to and disadvantages of anesthesia in dental surgical practice.

Certain types of patients requiring dental surgical care can be managed more satisfactorily under intravenous anesthesia than under other types of anesthesia. The alcoholic and athletic types can be cited as examples of so-called resistive types, that is patients who may not be good subjects for nitrous oxide-oxygen anesthesia in that in their case general anesthesia without some degree of cyanosis is often impossible. When pentothal sodium is administered intravenously by the intermittent injection technic of Lundy, its action may be considered controllable. Many thousands of cases of satisfactory intravenous anesthesia in dental surgery have been reported, and the technic now may be considered to be beyond the experimental stage. If it is used when indicated, its advantages are many; for instance, the absence of much excitement, the ease of administration, the simplicity of equipment required, the fact that it may be easily transported and the usual absence of postanesthetic nausea and vomiting.

Intravenous anesthesia can be employed in the place of nitrous oxide-oxygen anesthesia in most instances, but it is contraindicated for children less than 10 years of age. Pentothal sodium is detoxified rapidly in the body and is eliminated over a short period. The average decrease in systolic blood pressure ranges from 10 to 20 mm. of mercury. This decrease in blood pressure and the usual absence of excitement point to its usefulness, as compared to nitrous oxide-oxygen anesthesia, for patients who have hypertension. Any pulmonary complications which might affect respiration may contraindicate intravenous anesthesia, because of the depressant effect of the barbiturates on respiration. Debilitated patients usually tolerate intravenous anesthesia well, but in these cases less of the drug will be required than for normal patients, and administration must be carried out with much

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caution. This rule applies also to elderly persons.

Pentothal sodium is supplied in sterile ampules containing 1 gm. (15 grains) of the drug in powder form (Fig. 1), with accompanying ampules of sterile distilled water for making up the solution. Until recently, solutions of 5 per cent of the drug have been employed, but because of the fact that isolated instances of delayed phlebitis have occurred after the use of such a concentration, a solution of 2.5 per cent of the drug is now routinely employed. This solution is prepared by dissolving 1 gm. (15 grains) of pentothal sodium in 40 cc. of sterile water. Since this concentration has been used, no instances of venous irritation have been observed, and it appears that the margin of safety has been increased and the danger of overdosage has been lessened.

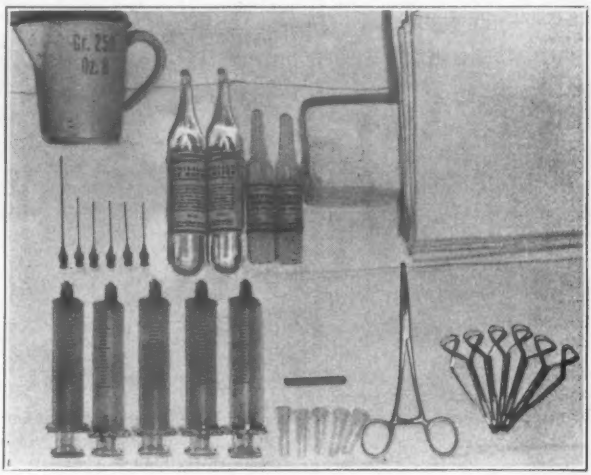

Fig. 1.—Ampules of pentothal sodium and sterile pure water, syringes and other instruments or articles commonly used in intravenous administration of pentothal sodium for anesthesia for dental operations.

Anesthetics preferably should be administered intravenously with the patient in the recumbent position, and the extremities should be immobilized. Usually, a vein in the arm or hand on the side opposite that on which the surgeon will work is chosen. (Fig. 2.) An antiseptic is applied at the site of venipuncture. After venipuncture, aspiration of blood into the syringe will serve to demonstrate that the needle is in the vein. Before administration of the solution is begun, it is important to place a mouth prop between the teeth. As the injection is begun, the patient is instructed to count aloud or to make some other audible sound.

The initial dose, which is injected fairly rapidly, varies between 4 and 6 cc. of the 2.5 per cent solution. This initial dose should be reduced if the patient is elderly or debilitated. After the initial dose, a pause is made to allow the drug to take full effect, which will require from ten to thirty seconds. If the initial dose is not sufficient to induce sleep, additional doses of approximately 2 cc. of the solution, with pauses between, may be administered until anesthesia ensues. This method of administration, which allows a certain amount of time between each two injections, is

of considerable importance in preventing overdosage.

On induction of anesthesia, the respiration becomes depressed and, for a brief interval, may be minimal. Because of this, the use of a cleansing-tissue "butterfly" over the mouth and nose of the patient will be advantageous. By means of the movements of this tissue with respiration, the anesthetist can determine whether breathing is adequate. In surgical operations in the region of the mouth, it may not always be convenient to employ this indicator, and, in its absence, the anesthetist may use the movements of the thorax and abdomen as well as the patient's color, as a guide.

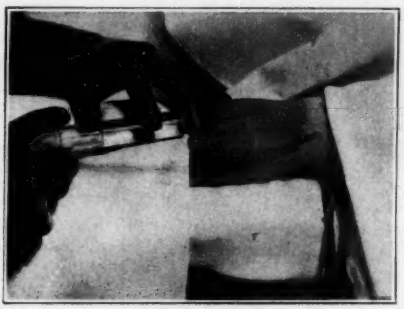

Fig. 2.—Method of injection of pentothal sodium into vein in forearm, after previous preparation of site of venipuncture with antiseptic agent.

The pulse should be frequently felt throughout anesthesia. The degree of respiratory depression is a reliable index of the depth of anesthesia. A lightening of anesthesia is evidenced by a gradual return to normal of the respiratory volume; hence, when this phenomenon is observed, an additional injection of the anesthetic may be made. As the depth of anesthesia increases, the respiration becomes progressively more shallow. If an overdose is administered, respiratory arrest may occur. One of the most important rules to observe in administering anesthetics intravenously is never to give a single dose which may result in respiratory arrest. The respiration also serves as a guide in lightening anesthesia. When this occurs, the depth progressively increases and respiration may become irregular.

In dental surgery, light anesthesia has some advantages. When the jaw is not completely relaxed, the cutting of tooth or bone is made much easier. Although the anesthesia may become sufficiently light to result in movements on the part of the patient or even an outcry, there is usually no recollection of pain after the return to full consciousness.

Anesthesia so light that the patient is on the point of moving can usually be

Fig. 3.—Method of introduction of rubber catheter, lubricated with sterile vaselin, into pharynx through one nostril for maintenance of nasal airway during anesthesia.

recognized by tensing of the muscles under the hand holding the syringe. This may be followed by slow movements of the extremities. An additional injection of 2 or 3 cc. of the 2.5 per cent solution at this time will usually abolish these movements. However, if the operative procedure should result in excess stimulation, jerky muscular contractions are apt to take place, which may displace the needle from the vein. If the anesthetist observes the respiration closely, he will be able to administer an additional dose before involuntary muscular

movements occur. However, in dental surgery, it is not objectionable to wait for the first sign of muscular reaction, and this method may be somewhat safer for the beginner than other methods.

As the end of the operation is approached, it is desirable to allow the anesthesia to become light so that, when the operation is completed, the patient may have sufficient control of the laryngeal reflexes to expectorate blood and mucus. Postoperative effects of anesthesia, such as nausea and headache, are seldom encountered. An occasional patient may cough or sneeze during anesthesia, particularly after induction. The anesthetist should not attempt to deepen the anesthesia rapidly in order to obliterate these reflexes. Rather, the surgeon should discontinue any manipulations for the time being; for, as the depth of the anesthesia is gradually increased, the coughing or sneezing reflex will be abolished. The same applies to the few patients who experience laryngeal spasm. In some instances, this spasm is severe and is often accompanied by marked cyanosis. When this condition is more than transient, the administration of the intravenous anesthetic should be discontinued and oxygen with 5 per cent carbon dioxide should be administered.

Usually, this measure will relieve the anoxemia and the spasm. Further deepening of anesthesia may then be carried out. In rare instances, the spasm may persist; in which event, the airway must be restored as quickly as possible by artificial means. The best means of doing this is an endotracheal tube, introduction of which will be facilitated by spraying the region of the glottis and pharynx with a topical anesthetic solution such as 10 per cent cocaine or metycaine. The primary and cardinal sign of overdosage is severe prolonged respiratory depression or arrest. When this occurs, administration of the anesthetic should be discontinued at once; a free airway should be established, and immediate artificial respiration, together with the administration of oxygen with 5 per cent carbon dioxide, should be carried out.

The administration of certain so-called respiratory stimulants, such as metrazol, picrotoxin or a 25 per cent solution of pyridine betacarbonic acid diethylamide (coramine), may result in some advantage, but their use should never supplant prompt and continuous artificial respiration and administration of oxygen until spontaneous breathing has been resumed. They may, however, be considered as adjuncts to the aforementioned treatment.

The value of oxygen with carbon dioxide, together with artificial respiration, in the presence of severe respiratory depression cannot be overestimated. Therefore, it is essential that equipment for administering these agents be at hand,

Fig. 4.—Endotracheal tube as employed for patient undergoing dental operation.

together with the means for establishing a free airway, whenever intravenous anesthetics are being administered.

When pentothal sodium is the anesthetic of choice for dental surgical procedures, the dentist should keep in mind the length of time required for the operation and the difficulties which may be encountered in maintaining an airway. The dentist who works without a surgical assistant often subjects his patients to a long period of anesthesia and operation because of the added attention which must be devoted to the control of hemorrhage and support of the jaw. An assistant, to aspirate blood and mucus, is indispensable when the operation is more than simple extraction. The infiltration of procaine hydrochloride and epinephrine is valuable for hemostasis when extensive surgical treatment is to be administered and when a dry operative field is essential. By such an infiltration, not only is the operation facilitated, but also there is less danger of mechanical obstruction of the airway such as occurs when blood flows into the oropharynx.

We cannot overemphasize the necessity for maintaining a free airway throughout the procedure. During the periods in which the respiration is depressed, it is possible that partial obstruction to the airway may occur unnoticed until marked cyanosis is evident. Unless anesthesia is deep, the airway can be maintained without artificial devices. Occasionally, it may be necessary to employ some type of artificial airway. Since oral airways may encroach on the site of the operation, nasal airways are preferable. A rubber catheter, cut to suitable length, provides a simple and satisfactory pharyngeal airway (Fig. 3). The required length of the catheter can be ascertained by measuring the distance between the tip of the patient's nose and the tragus. The catheter is lubricated well with sterile vaselin and inserted in the pharynx through one nostril.

In patients in whom it is difficult to maintain a free airway by these simpler means or on whom a prolonged and difficult operation is anticipated, it will be beneficial to employ an endotracheal tube by the nasal route (Fig. 4). This is accomplished in a manner similar to that mentioned for passing an endotracheal tube for purposes of resuscitation; that is, the nasal passages and the region of the glottis are sprayed with a topical anesthetic solution, and if it is impossible to pass the endotracheal tube into the trachea blindly, the glottis is visualized by means of a laryngoscope and the tube is inserted under direct vision.

To prevent aspiration of blood and mucus around the endotracheal tube, the oropharynx is firmly packed with moist gauze. In prolonged or difficult operations, this method offers by far the greatest degree of control when a general anesthetic is indicated. An unobstructed airway is maintained and the danger of the patient's aspirating foreign material is obviated. However, intravenous anesthesia and the foregoing procedures which may have to be used in connection with it require both experience and skill. Therefore, it is necessary that an anesthetist skilled in all these procedures manage the administration.

Recovery from the short period of anesthesia necessary for the majority of dental operations is rapid. This is particularly true if no preliminary medication has been employed. When it is anticipated that the operation will be short and uncomplicated, it is preferable to withhold preliminary medication. For long and complicated operations, preliminary medication with one-sixth grain (0.01 gm.) of morphine, one-hundredth grain (0.00065 gm.) of atropine, and 1½ grains (0.1 gm.) of pentobarbital sodium, for the average robust adult, will decrease the total amount of the intravenous anesthetic agent necessary to carry out the procedure. As a result, the period of recovery of the patient

will be proportionately lengthened.

After a short period of anesthesia without premedication, the patients may be awake before they leave the operating table. They may answer questions intelligently and may otherwise appear to be perfectly normal. However, on requestioning after a few minutes, they may not recall what they have said. Similarly, a patient who appears fully awake and oriented immediately after the operation may be both dizzy and ataxic when he begins to move around. These points are brought out to emphasize the fact that there are often latent "hangover effects" from the anesthetic and, for this reason, we wish to emphasize the importance of allowing time for recovery before the patient is allowed to leave the hospital. Even those patients who appear to be normal should be asked to lie down for a considerable period (one to two hours), and when they do go home, they should be accompanied by a responsible person. If this rule is followed, unfortunate accidents may be avoided. It is for these reasons that we do not advocate the routine use of intravenous anesthesia for dental surgical operations outside the hospital; in other words, in the dental office. It may be permitted in the dental office, however, if a competent anesthetist is in charge; if the above mentioned equipment is available to cope with any emergency, and if there is a place available for watching the patient during the recovery period.

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INTERMAXILLARY RELATION ESTABLISHED BY BITING POWER

By RALPH H. BOOS, D.D.S., Minneapolis, Minn.

THE intermaxillary relation has long been an interesting problem from a mechanical as well as a biologic standpoint. Many factors must be taken into consideration, as there is the problem of vertical dimension and also the lateral and anteroposterior position of the mandible.

The proper relationship between the maxillae and the mandible would include function of the muscles, balanced occlusion and provision of the ideal condition for each patient. To assure the proper relationship, not only what distance the bite should be opened or how far it should be closed, but also the horizontal position of the mandible must be considered.

There are many factors in establishing an intermaxillary relation. Primarily, these are factors of structure and tissue. In addition to these fundamentals are the mental condition, previous restorations, esthetic considerations, the condition of health and the mechanics of the case.

I shall first consider the anatomic factors. Primarily, the mandible is moved by the muscles. Whether or not the movements are guided by the condylar path, it is the muscles that determine the movements of the mandible.

Muscles are also the basis of facial expression as well as a part of the facial contour. A study of the anatomic arrangement and physiologic function of the muscles provides a basis for the positioning of the mandible.

The muscles of mastication, the temporal, masseter, internal pterygoid and external pterygoid, provide the functional movements of the mandible. Of these muscles, the temporal, masseter and internal pterygoid provide the biting force.

We are essentially interested in these muscles because their functioning raises the problem of the force on the denture mechanism. The intermaxillary relation is determined by the occlusion which is provided in the dental restoration.

The dental restoration maintains the degree of bite opening and determines the distance at which resistance is met with the contraction of the muscles to provide a biting force. In this way, the functioning of the muscles raises the primary problem.

According to the work of the physiologist, and the research of Alfred Gysi, the muscles of mastication are very strong. A reference to the strength of individual muscles is, of course, general, as they vary greatly in this respect. Dr. Gysi determined the average by measuring the area of muscle tissue at the widest part in cross-section. He found that the average force of the temporal muscle was 60 pounds. The masseter had an average force of 52 pounds, and the internal pterygoid, of 32 pounds.

These figures are for individual muscles and, as the functions of all muscles are coordinated under certain conditions, considerable power can be generated. This power, however, is limited by the

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individual circumstances and the ability of the occlusion or ridge to withstand the pressure.

The important point of muscle function is that there is a critical point in the distance from the origin to the insertion at which the muscle can exert the greatest force in contraction.

When the distance from origin to insertion is shortened, the muscle has less efficiency. When the muscle is stretched beyond the critical point, the efficiency is also reduced.

When the distance is shortened, the muscles have a tendency to lose tone, and although the reduced distance is maintained over a long period of time, they do not regain their maximum power. Muscles that are stretched beyond the normal tend to return to normal length unless the resistance is greater than the strength of the muscle.

In that the length of the muscles of mastication which provide the biting force is changed with the opening and closing of the mandible, the physiologic factors in muscle structure provide a basis of study of the efficiency of intermaxillary positions.

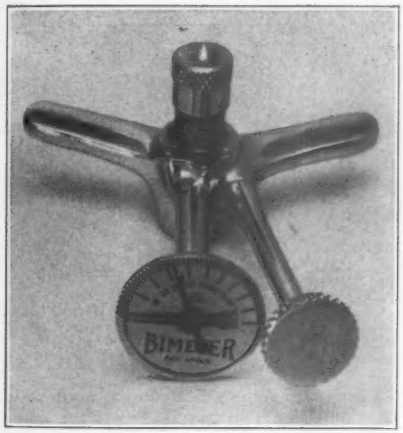

Fig. 1.—Gnathodynamometer; tripod frame, central bearing point. The cap turns to change the vertical dimension.

With this thought, a gnathodynamometer was developed which would record up to 100 pounds pressure. The instrument had a central bearing point which created an equivalent stress throughout the bases on which the instrument was mounted.

The resistance lies in a central bearing point mounted on a tripod frame which provides the connection to the denture bases. A cap on the top of the instrument can be turned to change the vertical dimension of the intermaxillary relation. A flat steel plate mounted in the palate of the upper denture base provides a bearing area for the central point.

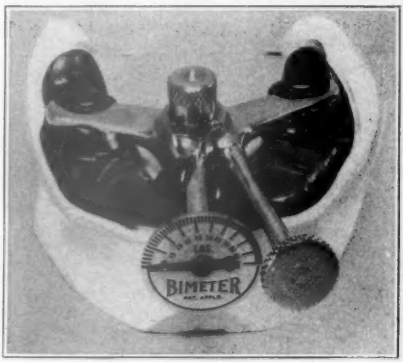

Fig. 2.—Instrument mounted on lower base ready for mouth.

The bases with the instrument mounted are carried to the mouth and the patient is instructed in regard to biting force and freedom of mandibular movements. An examination involves the registration of maximum biting force in various vertical positions in edentulous cases.

The instrument is accurately calibrated in pound registrations. The examination is made with the same patient and the same instrument and bases, at the same time; therefore it is a relative registration of resistance to determine the position of maximum registration for the individual patient. It is not absolutely necessary to

have an accurate calibration in pounds, because this is a relative registration. All factors are approximately the same except the intermaxillary relation, which is changed by means of the cap on the instrument.

In this way, the position of maximum efficiency can be determined on the individual patient. The registration might be considered as based on an examination of all the factors in denture construction. This would include muscle strength, tissue tolerance, tissue bearing areas and the condition of the patient.

More than 300 patients were examined, and it was found that, in every patient, there was in the vertical dimension a point of maximum power. In measuring the biting force exerted by different patients, at different points in the vertical dimension, it was found that the maximum power varied from 13 to 100 pounds.

Men, who average from 60 to 65 pounds, have registered all of the greater biting forces. Women average from 25 to 30 pounds, recording the smaller biting forces. Thus, finding a constant maximum power seems to prove the theory of physiologists that the muscles function with maximum force when stretched to a critical length between the origin and the insertion together with proper leverage.

The variance of the biting force depended directly on the vertical dimension. In certain patients, there was a variation of as much as 16 pounds pressure in 2 mm. of change in the vertical dimension at the central bearing point. The greatest variance was noted in those patients who had the greatest biting power.

In the presence of a weak muscular action, there would not be much variation in the vertical change. However, each case varied enough in the different vertical dimensions to determine a point of greatest power.

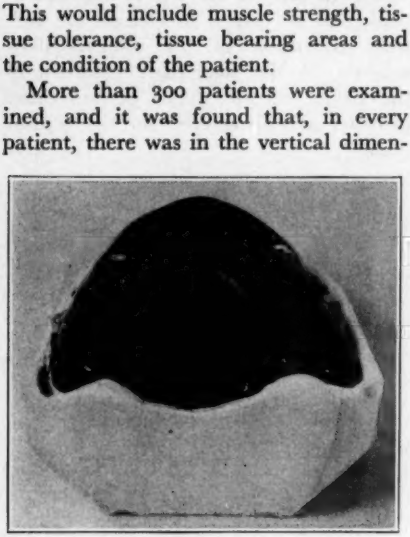

Fig. 3.—Flat steel plate in palate of upper base for bearing area.

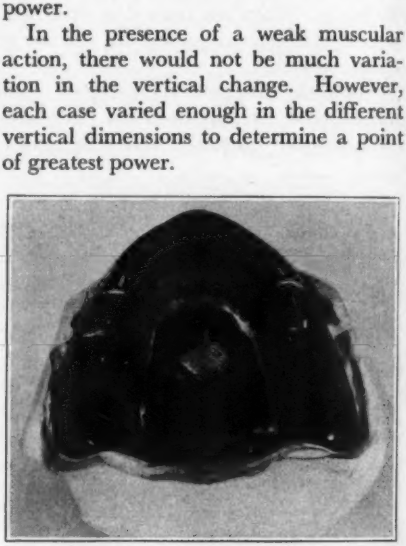

Fig. 4.—Tracing indicated on bearing plate. The hole near the apex indicates the power point.

Examples of examinations are as follows. The vertical dimension indicated was measured from the base of the nose to the chin.

Patient A

Vertical dimension, 117 mm.; biting force in pounds, 30.

Vertical dimension, 121 mm.; biting force in pounds, 31.

Vertical dimension, 122 mm.; biting force in pounds, 40.

Vertical dimension, 125 mm.; biting force in pounds, 46.

Vertical dimension, 128 mm.; biting force in pounds, 38.

Patient B

Vertical dimension, 114 mm.; biting force in pounds, 20.

Vertical dimension, 116 mm.; biting force in pounds, 28.

Vertical dimension, 118 mm.; biting force in pounds, 20.

For Patient A, a vertical opening of 125 mm. registered a maximum power of 46 pounds. Starting at 117 mm. vertical dimension, the biting force was 30 pounds, increasing with the opening to 46 pounds. A 3-mm. opening beyond the maximum power caused the bite to decrease to 38 pounds, a loss of 8 pounds.

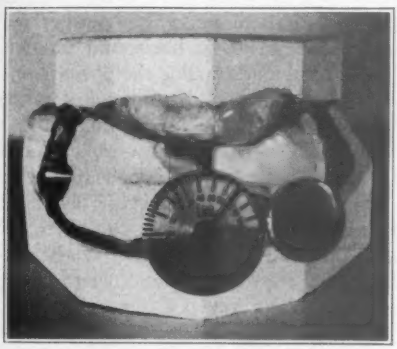

Fig. 5.—Plaster locks for complete assembly of bases and models ready to mount on articulator.

The maximum pressure was located by starting with a closed bite and opening the vertical dimension 1.5 mm. at the central bearing point for each registration. (An examination can also be made by starting from an extreme opening, and closing gradually.) The maximum power was located by continuing to open 1.5 mm. for each bite registration until a decrease was noted.

Care was exercised to obtain the maximum biting force in each position registered. In order to obtain a correct registration, the patient must record the maximum biting force for each position.

Recognition of the possibility of fatigue was evidenced by proceeding slowly and observing the condition of the patient. Normally, fatigue would not enter into the registration because only from ten to twelve registrations would be necessary to find the maximum biting power.

To determine whether the position of maximum power was constant, the same patients were examined at different times. Sometimes, the maximum biting power was verified, starting with an extreme opening and closing the mandible. It was interesting to note that although various maximum powers were registered, the intermaxillary relation remained the same.

The bite of many patients was registered at intervals with the same bases and instrument. On one day, the registration might have been 52 pounds and the following day, 60 pounds, but the intermaxillary relation remained the same.

Several patients were examined with a lapse of six or ten months between registrations. In these cases, the point of maximum power remained the same in the intermaxillary relation.

One patient was examined at four different intervals during a period of two weeks. Maximum power registrations were as follows: 72, 68, 78 and 84 pounds.

The intermaxillary dimension remained constant for each patient, although there was a variation in the maximum pounds recorded.

Many patients were examined to determine whether maximum power would be possible with the vertical dimension of dentures which they were wearing. Cases were selected of denture patients with closed bites who had worn dentures over a period of ten years or more.

In every case, the vertical maximum power was present in a considerably more open relation than the denture occlusion.

One woman, aged 62, had a bite of 9 pounds pressure at the point of occlusion of the dentures. At an opening of 9 mm. extra-orally, the maximum pressure was 18 pounds, showing a marked improvement in function and esthetic values.

Patients wearing extremely closed dentures had weaker biting power at the maximum than those whose dentures were nearer the dimension of maximum power. This would seem to indicate that there was better muscular activity in those patients whose vertical dimensions were closer to those at the maximum power. These examinations also seem to indicate that a constant point can be recorded in the intermaxillary relation.

The second consideration in registering the bite is the centric relation, or the lateral and anteroposterior position of the mandible in relation to the maxillae. Centric relation has been defined as the starting point of the movements of the mandible. The general belief has been that the centric position is at the apex of the gothic arch. In all of the registrations, a gothic arch tracing was made after the vertical dimension at the maximum power was established.

This provided a tracing of the movements of the mandible in a flat plane, giving the extensions in all directions and in the most retruded position, which is the apex of the gothic arch.

After the tracing was recorded, the horizontal position assumed by the mandible in making the maximum power registrations was examined. The patients are originally instructed to assume the most comfortable position to record biting force. They are free to move the jaw into any horizontal position desired which affords a free recording.

The horizontal position was recorded by the central bearing point marking on the central bearing plate. This was also verified by an extra-oral registration. This point of the intermaxillary relation, which included the horizontal and the vertical position, was termed the power point, or that relation of the mandible to the maxillae at which the greatest power can be recorded.

In the majority of cases, approximately 65 per cent, the power point of the mandible was located 0.5 mm. protrusively from the apex of the gothic arch. In 35 per cent of cases, the power point was more than 0.5 mm., protrusively and laterally. This varied from 1 to 7 mm.

The cases with the power point more than 0.5 mm. from the apex of the gothic arch had a history of loss of teeth, of malocclusion or of wearing ill-fitting or otherwise unsatisfactory dentures.

We now have two fundamentals in the intermaxillary relation, with the possibility of applying them to practical denture construction. First, there is the constant point of vertical maximum power; second, the relation of horizontal position. These combined provide the power point.

In building the dentures, restoration to the power point, an opening greater than at the maximum power point, may be considered in the danger zone. Although the biting power is less above the maximum point, the muscle fibers are physiologically under tension in attempting to restore the normal length from origin to insertion. In dentures with a power point above the maximum, the muscles would be under constant tension in occlusion.

To relieve the tension, the bite is closed from the maximum power point. As a guide for the initial closure, the Planer technic, presented to the profession years ago, is used. Dr. Planer observed the free space between the physiologic rest and the physiologic occluding position in normal dentition. He determined the average to be 1.5 mm. at the area of the first molars. The area of the first molars is approximately the central bearing point of the instrument. Therefore, the vertical dimension is closed 1.5 mm. from the maximum power position, which is approximately 3 mm. extra-orally.

In edentulous mouths which are completely tissue bearing, there is evidence of tissue displacement under denture bases. This is noted especially in patients who have great biting power. Although the vertical dimension could be increased slightly intra-orally, the extra-oral measurement would remain the same.

To compensate for this displacement, the following closures were required:

From 0 to 35 pounds maximum power, close 1.5 mm. from the power point.

From 35 to 60 pounds maximum power, close 2 mm. from the power point.

At 60 pounds and beyond, close 2.25 mm. from the power point.

In applying a denture technic to the fundamentals, these figures seem to indicate the maximum full opening possible in denture construction.

Sometimes, a full opening of the vertical dimension may not be desired. It may be difficult for a patient to accommodate himself to a full opening, although ideally, and with proper preparation, the maximum opening would, it seems, assure a better general condition.

When there is a desire to facilitate accommodation to a vertical opening for the average case, the following closures can be used:

From 0 to 50 pounds maximum, close 2.25 mm. from the power point.

From 50 to 100 pounds maximum, close 3 mm. from the power point.

Clinical evidence may, in the individual case, require altering these closures from the maximum opening. The mental condition, the condition of the ridges, etc., may suggest that less power be permitted at the denture occlusion. The technic may be varied to meet the individual condition.

After the vertical dimension for denture construction has been established, the gothic arch tracing is recorded and the power point examined. If the power point is in the normal position, 0.5 mm. protrusively from the apex of the gothic arch, the centric position is set at that point and a registration completed with plaster locks.

If the power point is abnormally placed, the centric position is still normal, 0.5 mm. protrusively from the apex of the gothic arch, and the registration is completed. To compensate for the abnormal power point position, another registration is taken at the power point, which can also be accommodated after mounting on an articulator in centric position, by moving the models to the power point.

In all denture cases, there should be a balance in all excursions with emphasis on balance at centric position and the power point. This is necessary as the patient will record the maximum bite at the power point, but still can move into centric position and other positions in balance.

In consideration of the power of the muscles of mastication and the variable amount of power of each patient, we can recognize the effect of stress which must be carried by the denture areas.

In comparing the denture retention to the biting power, we find that the maximum retention of a lower denture is $17\frac{1}{2}$ pounds. This recording was made by attempting to pull a lower denture out of place with a scale. At nearly all bite registrations, a much greater power is exerted than $17\frac{1}{2}$ pounds, which would dislodge the lower denture. Therefore, the biting force is the strongest factor in denture construction and the denture should be constructed to accommodate itself to this force.

In considering the biting force in relation to impression taking, it would hardly seem feasible to register the impression under extreme pressure. If it were possible, there probably would be an extensive displacement of tissue, which would result in failure of the denture. Denture areas are extremely vascular and a displacement might lead to recession.

Some displacement can be effected

with the impression, but, because of the variable stress and a biting stress in some cases as high as 100 pounds, it would seem more logical to effect the displacement of tissue at the time the bite is registered.

When the bite is opened and free from stress, the denture bases will fit without displacement in different areas. When the biting force is applied, the denture bases have more nearly equalized seating, according to the ability of the tissue to become displaced in the different areas. If the ridge had a pad of one-quarter inch in one area and one-eighth in another, the displacement would vary under biting stress, as would the position of the denture base.

To maintain an equal occlusion, the biting pressure should be recorded in the bite registration. An impression under compression is more or less arbitrary with the operator, and areas may be displaced which do not register that condition under biting force. This may aid in reducing ridge recession and provide a stimulating movement of the bases.

Dentures which have been constructed without registering tissue displacement under biting conditions or central bearing are usually not in correct tissue relation, and the base may have a rocking effect. This can be corrected by placing carding wax over the posterior teeth and having the patient register centric position under biting stress. The wax should be quite hard in order to provide resistance to the biting stress. Another method is mounting a central bearing pin in the dentures and recording the registration under biting force.

For correction or milling, dentures are mounted on an articulator with the wax registration, and ground to occlusion. Milling or correction apparently cannot be carried out by grinding or milling in the mouth. This is because the biting force is greater than the retention of the dentures and the bases will not be in correct apposition to the tissue. A balanced occlusion under biting stress is essential.

SUMMARY

1. The movements and position of the mandible in relation to the maxillae are controlled by the muscle and skeletal structure. The muscles are in their normal relationship when the normal distance is maintained between origin and insertion.

2. Muscles function at maximum force of contraction when there is a critical point between the origin and the insertion.

3. A constant vertical dimension of maximum power can be determined in the intermaxillary relation by registering the power in various intermaxillary relations.

4. The power point is attained in that relation of the mandible to the maxillae at which the maximum power of muscular contraction can be registered.

5. The power of the bite varies in different persons according to the muscular development and the ability of the tissues to withstand stress.

6. The length of muscle from origin to insertion giving maximum efficiency remains constant. The strength is dependent on the conditions of registration.

7. The power point, or position of greatest power and comfort, is found to be 0.5 mm. protrusively from the apex of the gothic arch in the majority of cases. In some cases, the power point is definitely protrusive or lateral.

8. The application of a denture technic to the fundamentals of the power point is accomplished by closing the vertical dimension from the power point as required by the conditions of restoration.

9. Because of the variable power of different persons and the variable displacement of tissues, the displacement of tissue should be registered at the bite registration. The impression should provide a slight displacement in order to conform to normal tissue.

10. Correction or milling should be accomplished on an instrument from a recording under biting pressure.

These observations have been made in research with the gnathodynamometer. The work of many men on the dental mechanism has been appreciated as an aid in continuing the study of the intermaxillary relation.

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A PRELIMINARY REPORT ON THE USE OF SULFANILAMIDE IN THE AVERAGE EXTRACTION CASE

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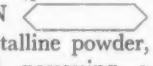
THE enthusiasm and widespread success with which sulfanilamide and its derivatives are being used in the treatment of certain infectious diseases have naturally directed attention to their possible application to dentistry. Favorable reports on the use of sulfanilamide in oral lesions have been presented by Sinclair and Barker and by Lancier.[1] During the course of the present investigation, De Wolf published a brief report on the use of sulfanilamide, glycerine and guaiacol.[2] The apparent efficiency of sulfanilamide has tended to minimize its possible harmful effects and set limits to its therapeutic usefulness.

The present investigation was undertaken in an attempt to secure information on the value of sulfanilamide in the average uncomplicated extraction case.

At this point, it might be well to consider, briefly, the pharmacology, mode of action and toxic manifestations of sulfanilamide. Sulfanilamide[3] (para-amino-benzene-sulfonamide, H_2N  SO_2NH_2) is a white crystalline powder, practically odorless and possessing a slightly bitter taste with a sweet aftertaste. It is slightly soluble in water, approximately 0.9 parts in 100 at 20-25° C, and in solution has a pH of about 8.4.

There are three possible derivatives of this drug, ortho, meta and para amino-benzene-sulfonamide. The only one that is recognized by the Council on Pharmacy and Chemistry[4] of the American Medical Association is the para compound, designated as sulfanilamide. After administration, this drug is rapidly diffused through all of the body tissues and fluids, attaining its maximum concentration in the blood stream in from four to six hours.[5] It is almost wholly excreted by the kidneys. It appears in the body fluids, including saliva, in almost the same concentration as it is found in the blood.[6]

The mode of action of sulfanilamide is still not clear. Bliss and Long[7] (1937) reported that the drug inhibited the growth of susceptible organisms *in vitro* and *in vivo* and that *in vivo* it brought about a change in the micro-organisms which permitted them to be phagocytized by the white blood cells. However,

TABLE 1.—GROUP 1: CONTROL

Patient	Age	Sex	Teeth Extracted*	Clinical Condition Before Extraction	Appearance of Tissue Before Extraction	Results Postoperative				
						Pain	Swelling	Adenopathy	Appearance of Clot After	
									24 Hours	48 Hours
N.D.	31	♂	R 7	Pyorrhea, lateral abscess	Tissues hemorrhagic	None	Slight	None	Normal	Normal
R.B.	22	♀	L 8	Extensive caries	Normal	Slight	Slight	None	Normal	Normal
F.A.	55	♀	L G	Subacute abscess	Normal	None	None	None	Normal	Normal
S.K.	21	♀	L F	Pulp exposed by caries	Normal	None	Extensive	None	Normal	Normal
R.R.	24	♀	L 8	Inflamed operculum	Normal	None	Slight	None	Normal	Normal
N.N.	37	♂	L 8	Extensive caries	Normal	None	None	None	Normal	Normal
E.K.	26	♀	R 8	Inflamed operculum	Normal	Acute	Slight	Slight	Normal	Normal
M.S.	26	♂	R 7-8	Draining fistula, chronic alveolus abscess	Normal	None	Slight	None	Normal	Normal
N.F.	32	♂	L D	Diffuse chronic alveolus abscess	Normal	None	Slight	None	Normal	Normal
S.B.	28	♀	R E	Subacute alveolus abscess	Normal	None	Slight	Slight	Normal	Normal
M.W.	21	♂	R F	Subacute alveolus abscess	Normal	Slight	Slight	None	Normal	Normal
M.G.	34	♂	L H	Extensive caries	Normal	None	None	None	Normal	Normal
M.S.	26	♂	L B	Granuloma	Normal	Slight	Slight	None	Normal	Normal
M.N.	28	♂	R B	Malformed tooth	Normal	Medium	Medium	None	Normal	Normal
M.F.	34	♀	L G	Pulp exposure	Normal	Medium	Medium	None	Normal	Normal
L.K.	24	♀	L H	Pyorrhea	Normal	None	None	None	Normal	Normal
S.S.	44	♂	L H	Inflamed operculum	Normal	Acute	None	Slight	Not seen	Normal
M.A.	46	♂	L F-G	Pyorrhea	Hemorrhagic	Slight	Slight	None	Not seen	Normal
M.A.	46	♂	R 6-7	Pyorrhea	Hemorrhagic	Slight	Slight	None	Hemorrhagic	Normal
P.L.	51	♂	L a-b	Pyorrhea	Hemorrhagic	Acute	Medium	Slight	Slight clot fills ⅓ of alveolus	Slight clot fills ⅓ of alveolus

*G. V. Black's method of indicating teeth is employed in Tables 1-3.

according to Lockwood (1938), the sterilizing action of sulfanilamide is not dependent on the participation of the phagocytic cells, but on its interference in the protein digestion mechanism of the invading organism. Some of the clinical results of sulfanilamide therapy are explained by Lockwood through these concepts of the action of the drug.[8] McIntosh and Whitley (1939) claim definitely that sulfanilamide does not stimulate the leukocytes to activity and does not set up immune responses in the body. This mode of action does not resemble that of simple germicides.

Sulfanilamide appears to act through interference with some metabolic function or essential enzyme.[9] Kiefer states that, for optimum therapeutic effectiveness, sulfanilamide must be present in the blood in a concentration sufficient to maintain a maximum bacteriostatic action, thus enabling the normal defense mechanism to bring about final destruction of the infecting organisms. The optimum effective concentration that must be maintained is 7-10 mg. per hundred of blood.[10]

Because of the toxic effects of sulfanilamide, particularly on the hematopoietic[11] system, treatment by oral administration or subcutaneous injection or parenterally should not be undertaken unless arrangements are made for daily attention by a physician, which includes careful periodic examination of the blood. The following are the mild toxic symptoms: headache, lassitude, weakness, general malaise, anorexia, drowsiness, cyanosis, mental dulness, loss of weight, constipation, nausea and dizziness. The moderate toxic symptoms are: acidosis, acute febrile reaction, severe generalized urticaria, erythematous maculopapular eruption, edema of the lower extremities, tender hyperemic subcutaneous nodules of the lower extremities, acute schizophrenic breakdown, secondary anemia and abdominal pain. Any one of these symptoms should give rise to serious consideration of withdrawal of the drug. The severe toxic symptoms are: agranulocytosis, acute hemolytic anemia, peripheral neuritis and optic neuritis.[5]

Sulfanilamide is now being advocated for routine use in dentistry without adequate evidence of usefulness under dental conditions, and apparently without an appreciation of the nature of this drug or of the requirements for an accurate appraisal of its possible value in dentistry. For these reasons, clinical studies were initiated, and in an attempt to determine the effects of local and systemic administration of sulfanilamide following uncomplicated extractions. A particular effort was made to carry out these studies under controlled conditions in order that valid comparisons between medicated and unmedicated cases might be made.

PROCEDURE

Of the sixty cases studied, none was complicated by the acute symptoms of alveolar abscess, although, in one or two, there were subacute manifestations of this condition. The same local anesthetic solution was used in all cases. Anesthesia was effected by the block method. In each case, the patient's temperature, clotting time, color and condition of the tissues surrounding the tooth, and the reason for extraction were noted. A careful prophylaxis was performed in each case before removal of the tooth. Forceps were used for extraction of all teeth except the upper and lower third molars, for which an elevator technic was used. In each case, the blood was sponged out of the alveolus and a clot permitted to form under a modeling compound plug, which was kept in place for thirty minutes. Each patient received 10 grains of acetyl salicylic acid immediately on recovery from anesthesia.

Each patient was instructed to take a laxative, to drink an excess of fluids and to apply an ice pack for two hours. A normal saline mouthwash was prescribed

TABLE 2.—GROUP 2: LOCAL THERAPY

Patient	Age	Sex	Teeth Extracted	Clinical Condition Before Extraction	Appearance of Tissue Before Extraction	Results Postoperative				
						Pain*	Swelling	Adenopathy	Appearance of Clot After	
									24 Hours	48 Hours
E.S.	32	♀	L 7	Apical granuloma	Normal	XXXX	Slight	None	Normal	Normal
F.R.	61	♂	L 4-5-6	Pyorrhea	Normal	X	Slight	None	Normal	Normal
M.S.	54	♂	L G	Pain, pulp exposed, caries	Normal	XX	Medium	Slight	Normal	Normal
L.W.	23	♂	R 7	Pulp exposed, pain	Normal	XXXX	None	None	Normal	Normal
W.W.	46	♂	L G	Subacute abscess	Normal	XX	Medium	Slight	Normal	Normal
M.T.	62	♀	R H	Normal	Normal	XX	Medium	Slight	Normal	Normal
M.S.	26	♂	R E-f	Granuloma	Normal	XXX	Medium	None	Normal	Normal
L.R.	31	♀	L G	Pulp exposure, caries	Normal	XXXX	Extensive	None	Normal	Normal
I.B.	34	♂	R 1-2-3 L 1-2-3	Roots	Hemorrhagic	None	Slight	None	Normal	Normal
I.B.	34	♂	R 7	Abscess	Normal	None	Slight	None	Normal	Normal
F.R.	61	♂	R 4-7	Pyorrhea	Normal	X	Slight	None	Normal	Normal
N.D.	31	♂	R 5	Pyorrhea	Normal	X	Slight	None	Normal	Normal
E.C.	21	♀	L 4	Granuloma	Normal	XX	Slight	None	Normal	Normal
A.P.	35	♀	R 8	Caries	Normal	XX	Slight	None	Normal	Normal
M.S.	26	♂	L 6	Granuloma	Normal	XXX	Medium	None	Normal	Normal
M.A.	46	♂	L 4-5	Pyorrhea	Hemorrhagic	XXXX	Medium	None	Hemorrhagic	Hemorrhagic
M.A.	46	♂	R 4-5	Pyorrhea	Hemorrhagic	XXXX	Medium	None	Hemorrhagic	Hemorrhagic
H.S.	33	♂	L B	Tooth displaced by cyst	Normal	XXX	None	None	Hemorrhagic	Hemorrhagic
H.K.	34	♀	L 2-3	Draining sinus, chronic abscess	Hemorrhagic	XXXX	Medium	None	Hemorrhagic	Hemorrhagic
L.K.	24	♀	R 8	Normal, caries	Normal	XXX	Slight	None	Hemorrhagic	Hemorrhagic

*X, slight; XX, medium; XXX, severe; XXXX, acute.

for use every three hours. Patients were asked to report by telephone their temperature at home five hours after extraction and a notation was made as to postoperative pain and swelling noted by the patient. In every case, the patient was instructed to return twenty-four hours after extraction and again after forty-eight hours. Records were taken of the postoperative pain, swelling, adenopathy and condition of the local tissues after twenty-four and forty-eight hours.

The modeling compound plug was made by adapting a small piece of soft sterile modeling compound to the space left by the extracted tooth and over the proximal teeth. The patient was then instructed to close the jaws in order to force the compound into and around the alveolus and to assure occlusion with the opposing arch to aid in maintaining it in position. The soft compound was then chilled, removed from the mouth and trimmed so that none protruded into the alveolus. This plug was used in all three groups.

The sixty cases were divided into three groups of twenty each.

Group 1 was used as a control group. In these patients, no postoperative therapy with sulfanilamide was instituted.

TABLE 3.—GROUP 3: ORAL ADMINISTRATION

Patient	Age	Sex	Teeth Extracted	Clinical Condition Before Extraction	Appearance of Tissue Before Extraction	Results Postoperative*	
						Pain	Swelling
E.L.	29	♀	R 5	Granuloma	Normal	XX	Slight
O.I.	63	♀	L 5	Pulp exposed, extensive caries	Normal	X	Slight
P.L.	51	♂	R A-B	Pyorrhea	Hemorrhagic	None	None
M.A.	31	♂	L 1-2 R 1-2	Pyorrhea	Normal	None	Medium
R.W.	23	♂	L 4	Granuloma	Normal	None	None
M.G.	20	♂	L F	Granuloma	Normal	X	Medium
H.K.	34	♀	L 6	Diffuse chronic abscess	Normal	X	Extensive
M.T.	29	♀	L 6	Subacute abscess	Normal	XXXX	Extensive
E.P.	31	♂	R G-H	Granuloma	Normal	XX	Medium
M.A.	46	♂	R EFG	Pyorrhea	Hemorrhagic	None	Extensive
I.T.	32	♂	R 6	Subacute abscess	Normal	Acute	Extensive
M.S.	54	♂	R H	Granuloma	Normal	None	None
H.S.	33	♂	R H	Extensive caries	Normal	None	None
S.H.	48	♀	L 5-6-7	Carious roots	Normal	X	Slight
F.R.	61	♂	R E-F	Pyorrhea	Normal	None	None
I.M.	25	♀	L H	Extensive caries	Normal	X	Slight
K.K.	47	♀	L 4-5	Granuloma	Normal	X	Slight
L.P.	40	♂	R 4	Subacute abscess	Normal	None	None
H.M.	40	♀	R 5	Subacute abscess	Normal	None	Slight
M.G.	34	♂	R G	Extensive caries	Normal	None	Slight

*There was no adenopathy in any case and the appearance of the clot after twenty-four hours and after forty-eight hours was normal in all cases.

Group 2 was used for local therapy. The procedure was as follows:

1. Extraction.
2. Alveolus sponged free of blood.
3. Sulfanilamide (powdered) placed directly in the alveolus by means of a wax paper funnel (5 grains for molar teeth; 2½ grains for bicuspid and anterior teeth).
4. Clot permitted to form under modeling compound plug.

Group 3 was used for therapy by oral administration. No drug was used locally. Each patient received 10 grains of sulfanilamide every four hours. The drug was withdrawn at the first appearance of any minor toxic symptom.

Whenever possible, each patient was placed in each of the three groups to permit at least some comparison of the effect of all three methods on the same individual. The results obtained are shown in Tables 1, 2 and 3.

COMMENT

The oral administration of sulfanilamide showed no significant advantage from the standpoint of greater healing, although no local irritation was noted and postoperative pain and swelling appeared to be somewhat lessened. In order to obtain any local effect from sulfanilamide, it is first necessary for the patient to take enough of the drug to raise its concentration in the blood stream to 4-10 mg. per hundred of blood. This immediately necessitates care by a physician plus the necessary blood tests to eliminate the possibility of injury to the hematopoietic system.[7] Even the mild toxic symptoms from oral administration of the drug so increase the discomfort suffered by the patient that they far overshadow any local value derived. This fact, coupled with the obvious dangers of oral administration, leads to the belief that the use of sulfanilamide in simple uncomplicated extractions is not justified.

It is interesting to note that if any benefit is to be derived from the use of sulfanilamide, it is through oral administration, since its absorption by all body fluids is so rapid and the levels attained are so high that there seems little purpose in administering it by any other route. The local administration of sulfanilamide in the series of cases studied was not shown to be of any benefit.

While the number of cases studied is small, particularly from the statistician's viewpoint, the results obtained did not appear sufficiently encouraging to warrant the hope that in a larger group of patients, the results might be more favorable to sulfanilamide. On the contrary, it might be expected that the effect would be the opposite. The routine insertion of an insoluble foreign body into an area to be occupied by a normal blood clot cannot be considered a rational practice. The data here presented show that actually there is an increase in degree of local irritation, postoperative pain and healing time.

These conclusions seem to agree with those conditions observed when an insoluble foreign body is present in an alveolus after extraction. The tissue reaction tends to be that of a prolonged period of inflammation and cellular activity, until the irritating factor is thrown off or removed by outside interference. It is common knowledge that the oral tissues are peculiarly adapted to their function. Incisions, unless they are made amply long and kept open with a drain of some sort, usually close in a short time in spite of the presence of acute infection. In the average uncomplicated extraction, if a normal blood clot forms and average postoperative cleanliness is maintained, healing takes place promptly without medication of any kind. It is only when the normal blood clot is interfered with or does not form properly that postoperative complications set in. The formation of a normal blood clot is a prime essential in the normal regeneration of tissue. The introduction of an insoluble substance, such as sulfanilamide, is certainly no stimulation to normal blood clot formation. The availability of the drug is probably diminished in a blood clot because of its low solubility in blood serum and by its action as a physical obstruction.

SUMMARY AND CONCLUSIONS

1. The oral administration of sulfanilamide in therapeutic doses in the average extraction case is of little or no value.

2. The use of sulfanilamide in the alveolus after a simple extraction increases the postoperative pain and swelling and retards granulation.

3. The availability of the drug is diminished because of its low solubility.

4. Sulfanilamide has its place in certain dental conditions, but its use must be based on established needs.

5. Sulfanilamide can be evaluated only by controlled observations.

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DENDRITIC KERATITIS
CAUSED BY ABSCESSED TEETH

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THE cause of dendritica keratitis, in America, is, in nine out of ten cases, malaria, while in Europe it is said to have the same source as herpes febrilis (caused by the common "cold-sore" virus). In the case reported here, no evidence of malaria was found, to account for the typical branching corneal vesiculation of the involved eye. No secondary invasion of the ulcerated areas occurred to produce the dreaded serpiginous ulcer of the cornea. The medical treatment was symptomatic, for the most part being confined to the use of a protective bandage, atropine, iodine applied to the ulcerated areas, antiseptic and protective ointments and hot fomentations, though milk injections were given intramuscularly for their temperature-producing and alterative action. Under this medical treatment, the eye condition improved very much, but not sufficiently that the disease process was stopped. The strong possibility of a focus of infection elsewhere than in the eye had to be considered.

Read before the North Side Branch of the Chicago Dental Society, April 16, 1940.

REPORT OF CASE

History.—The patient, a girl, aged 10, had been admitted to hospital, October 27, with a tentative diagnosis of serpiginous ulcer of the cornea of the right eye.

Oral Examination.—November 3, 1939, on consultation, a complete oral examination was made. The four first permanent molars were decayed beyond repair. In the lower right and left first permanent molars the pulps were exposed owing to caries. The crowns of the upper right and lower first molar were completely broken off, and the

remaining roots were partially covered with gum tissue. At this time, teeth, skull and lateral jaw roentgenograms also were taken.

Operation.—The same afternoon, owing to the spreading of the infection of the right eye, it was thought advisable to extract at least two of the four teeth under nitrous oxide (as the patient was hard to control and it was almost impossible to use a local anesthetic), all four teeth to be extracted at the same sitting, if it could be done without prolonging the anesthesia too much.

November 4, at 5 p. m., the patient was anesthetized and the four badly involved molars were extracted. The lower right molar was extracted first, with little difficulty. The upper right molar was next extracted, the gum tissue being cut away. The roots were also extracted. On extraction of these roots, a greenish yellow exudate oozed from the socket; which indicated that there was more infection in the alveolus than had been believed. Around the apices of the roots were small apical abscesses. After this area was carefully drained, operation was extended to the left side.

The patient was still breathing normally, although she had commenced to gag a little, but, with the aid of a little more nitrous oxide, normal breathing was resumed. The lower left molar was extracted without much difficulty. The remaining upper roots were then extracted and the area was drained as on the opposite side. As the roots were ex-

Fig. 1.—Right lateral view.

Fig. 2.—Upper right infected tooth.

Fig. 3.—Lower right infected tooth.

tracted, a fair amount of thick greenish yellow pus exuded. Pure oxygen was then administered to revive the patient and she was returned to her room, with instructions to the attending nurse for cold applications to both sides of the face.

Laboratory Findings.—By this time, we were thoroughly convinced that these teeth, especially the maxillary, had something to do with the infection of the eye. While the patient was in the operating room, a smear was taken of each extracted tooth and cultures were made on blood-agar broth. A smear had been taken of the right eye prior to extraction of the teeth, laboratory findings indicating a similar type of organism present, as shown in the following laboratory report. Complete laboratory identification of these organisms was not carried out, for economic reasons.

10/28/39: Smear from eye: Few epithelial cells; occasional gram-positive small bacilli.

Culture from cornea: White colonies of large gram-positive bacilli.

Culture from conjunctiva: Small translucent colonies of small gram-positive bacilli.

Fig. 4.—Left lateral view.

Fig. 5.—Upper left infected tooth.

Fig. 6.—Lower left infected tooth.

11/3/39: Cultures from teeth (on blood-agar, serum-agar-broth):

Right lower: Few small gram-positive bacilli; few small gram-positive cocci in pairs.

Left upper: Same as above; also a few larger gram-positive cocci in pairs.

Right upper: Heavier growth of same organisms as above.

No streptococci in any of the cultures.

After-Care and Outcome.—The patient was again examined that evening (November 4) and a liquid diet was prescribed. A mild mouthwash was to be used every three hours, and 3 drams of cascara was given as an aid to elimination of toxic materials. The sockets from which the teeth were extracted were well filled with coagulated blood. No swelling or tenderness was apparent, except in the lower left molar region, where there appeared a small edematous, hard area, which prevented the patient from opening the mouth normally. After the application of surgical packs, accompanied by warm moist applications to the affected area, and the use of a warm mild mouthwash every three hours during the night and the following morning, the swelling of this area was greatly reduced, and the mouth could be normally opened without difficulty. No fever or tenderness to pressure was experienced. The patient was then instructed to continue the treatment until the entire swelling was reduced.

The same day (November 5), the branching ulcer was completely healed, and that without any change in symptomatic medication, and the patient was discharged from the hospital.

In spite of five weeks of symptomatic medication, the keratitis dendritica had resisted all efforts to clear it up, until the infected teeth were extracted, nine days after the patient was seen (by H. D. C.). The parents reported that the carious teeth had deliberately been left in, because a dentist had told them that the other erupting teeth would come in in malalinement with the already erupted ones, if they were extracted. This evidently was only the apparent reason, the real one being that the child and her parents were so difficult to deal with.

The patient was seen frequently by Dr. Coles at his office until December 26, and the use of atropine was continued to December 31, as the right eye showed some ciliary-vessel injection on mechanical irritation, and the cornea was still somewhat anesthetic. The local use of quinine ointment was instituted to help clear up the usual *macula corneae* (opacity of cornea) resulting from the previous ulceration.

The parents were asked to bring the child in at least once every two weeks, but have failed to do so.

SUMMARY

This report indicates that infected teeth are a probable focus in keratitis dendritica.

Parents are prone to neglect their children's teeth unless the necessity for dental care is emphasized to them.

Children are, from the dental viewpoint, hard to treat, but situations like the one here described point to the necessity for firmness.

Medication of the cornea of the eye before extraction proved futile and the condition was not relieved until the offending teeth were extracted.

Healing of the eye within forty-eight hours after the infection was eliminated proved that the focus of infection was the infected teeth.

Prompt cooperation of the dentist and physician saved the involved eye, and, in all probability, avoided complications.

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RÔLE OF THE DENTIST IN ARTHRITIS

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ARTHRITIS is one of the most common causes of helpless invalidism in this country. Unfortunately, it has not sufficiently aroused the interest of the medical and dental professions, chiefly because it is neither fatal nor contagious. Although great strides have been made for the care of tuberculous patients, there are practically no facilities in the United States for the proper care of persons crippled with arthritis.

Classification of joint diseases is complicated. However, the physician and dentist must realize that there are many types of arthritis. A simple classification is as follows:

1. Traumatic joint disease (including sprains, bursitis, some cases of synovitis and fibrositis).

2. Infectious types:

A. Of known etiology:

Cases due to gonococci, the tubercle bacilli, pneumococci, *Treponema pallidum,* typhoid and paratyphoid bacilli, meningococci, staphylococci, streptococci, etc.

B. Of doubtful etiology:

Rheumatic fever.

Rheumatoid arthritis (synonyms: atrophic, chronic infectious, infective or proliferative arthritis).

Fibrositis (some cases are probably infectious).

3. Degenerative joint disease (synonyms: hypertrophic or degenerative arthritis, osteo-arthritis).

4. Neoplastic (benign or malignant; primary or secondary).

5. Neuropathic (associated with tabes dorsalis, syringomyelia, leprosy).

6. Miscellaneous: gout, hemophilia, serum sickness, intermittent hydrarthrosis, etc.

A complete study of the patient with joint symptoms is essential. A correct diagnosis must be made as soon as possible and all additional complications should be recognized at once. Although such a study takes time, it usually has the most satisfactory end-results. A complete history is the most important single factor in diagnosis. In addition to this, each arthritic patient should have a thorough physical examination, a complete blood count, urinalysis, blood Wassermann test, sedimentation test, blood uric acid determination and roentgen-ray examination of at least one of the affected joints. It is often necessary to request additional examinations, such as the gonococcus complement fixation test; complete dental x-ray examinations, even in the edentulous; examination of the synovial fluid; the agglutination test of the blood for brucellosis (undulant fever); the basal metabolic rate, etc., and consultations with the gynecologist, otolaryngologist, dentist, orthopedic surgeon, physical therapist, etc.

As it is impossible here to mention more than a few points of interest to the dentist, I shall confine my remarks to two of the more common forms of joint disease, namely, rheumatoid arthritis and degenerative joint disease.

RHEUMATOID ARTHRITIS

Rheumatoid arthritis is also known as chronic infectious, proliferative or atrophic arthritis. The disease usually begins

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between the ages of 20 and 45, although no age group is exempt. It is at least three times as common in women as in men. Symptoms include pain, swelling, tenderness and limitation of motion of multiple joints (often symmetrically affected); a low-grade prolonged fever; tachycardia, often out of proportion to the degree of fever; marked sweating; loss of weight (which may be marked); muscular atrophy, especially in the neighborhood of the affected joints; occasional subcutaneous nodules (in about 20 per cent of cases); a rapid sedimentation rate, and a generalized demineralization of the skeleton, with atrophy of joint cartilage and erosion of the ends of the affected bones. The typical patient with this disease is asthenic and markedly underweight. He has cold, clammy hands and feet and, frequently, low blood pressure. This is a general disease, not a disease only of the joints. Here is a sick, underweight, febrile, anemic patient. It is mainly in this type of arthritis that occasional good results following the elimination of focal infection have been reported.

Any joint in the body may be affected in rheumatoid arthritis. The hands, wrists, knees, elbows and feet are most commonly involved. In the hands, the swelling is fusiform or spindle-shaped, involving mainly the proximal interphalangeal and the metacarpophalangeal joints. Involvement of the terminal interphalangeal joints is uncommon in this disease, although it is exceedingly frequent in degenerative joint disease or osteo-arthritis.

Some rheumatologists have segregated from the cases of rheumatoid arthritis the cases in which the onset follows within several weeks an acute tonsillitis, acute paranasal sinusitis, acute prostatitis, acute periapical dental infection, etc. Such cases have been termed by some focal-infection arthritis. Certainly, in these cases, the best chance of improvement follows careful and complete eradication of the definite focus of infection.

In rheumatoid arthritis, the essential pathology of the joint disease consists of a synovitis, followed by a spread of the proliferative synovial tissue so that it covers the cartilage of the ends of the bones, leading to pitting, and, in some cases, complete destruction of this cartilage. There is an associated production of synovial fluid, which distends the joint, a stretching and thickening of the joint capsule and osteoporosis of the ends and shafts of the bones. If the process is unchecked, fibrous or bony ankylosis may result. This is the type of arthritis which may progress to helpless crippling and invalidism if improperly treated. In about 5 to 10 per cent of these cases, therapy seems to be of little avail except from the orthopedic standpoint.

DEGENERATIVE JOINT DISEASE

Osteo-arthritis, or degenerative joint disease, which presents an entirely different picture, begins most commonly in persons past 50 years of age, and never leads to true bony ankylosis or severe deformity. The process is really one of wear and tear due to advancing age, with gradual cracking and pitting of cartilage over the ends of bones; wearing down of cartilage and its complete disappearance in some cases; eburnation of the ends of bones which come in contact, so that they may become hard and smooth as billiard balls, and formation of cartilaginous or bony projections, known as osteophytes, in the periphery of the involved ends of bones.

Degenerative joint disease occurs most often in persons who are overweight and not anemic. It is not productive of fever, tachycardia, rapid sedimentation, generalized osteoporosis (except that associated with advancing age) or subcutaneous nodules. The joints which are most commonly affected include the terminal interphalangeal joints, knees, cervical and lumbar spine and hips. In the hands,

there may occur small cartilaginous or bony protrusions at the bases of the terminal phalanges, known as Heberden's nodes. They are usually only slightly tender and may result in slight deformity of the terminal phalanges. In the affected joints, there is no effusion, but creaking on motion is common. As it is believed that degenerative joint disease is a purely local joint phenomenon, the result of no infection, and probably due to the wear and tear of age, trauma or postural or occupational strain and, in some cases, endocrine conditions, there is certainly no indication for the elimination of so-called foci of infection in this disease in an attempt to cure the degenerative joint process. If definitely infected tonsils, periapical abscesses or other foci are discovered these may be removed as a general health measure if this is in accord with good judgment in the particular case at hand. Their removal may lessen the burden which the individual is carrying, but in such instances, the dentist must never even suggest to the patient that such an operation may favorably affect the arthritis.

Is there really such an entity as focal infection? Twenty-five years ago, the medical and dental professions were supporting this theory to such an extent that the possibility of curing almost any so-called infectious disease by the removal of a focus of infection was suggested. Analogous to the situation is the present widespread use of sulfanilamide, sulfapyridine and related compounds in many diseases in which there is no evidence of their value. For several years, a few investigators have attempted to minimize the value of removal of foci of infection and have in fact doubted whether focal infection plays any rôle at all in arthritis, iritis, nephritis, neuritis, fibrositis, endocarditis and other conditions.

Most practicing physicians will tentatively take the more reasonable middle ground; i.e., that some infectious forms of arthritis, nephritis, endocarditis and other diseases which follow an acute tonsillitis, prostatitis, the acute stage of a periapical dental infection, etc., are probably caused by dissemination of toxins or bacteria from an infected focus. Once the secondary disease has been established, removal of the focus will not necessarily result in improvement or cure of the distant lesion. However, it will probably decrease the possibility of subsequent infection.

Dental infection in arthritis usually implies pyorrhea alveolaris, apical infection or pulpless teeth. Unfortunately, most medical men know very little concerning the teeth and their disorders. However, they do not hesitate to inform the dentist that certain teeth must be extracted.

The dentist should be considered as a consultant rather than as a mechanic. He should make a thorough clinical and roentgenologic examination in each case of rheumatoid arthritis. Thirty per cent or more of edentulous patients harbor residual roots, many of which are infected. In addition, the dentist must look for impacted teeth with their attending infections, residual infection of the alveolar process, gingivitis, unsanitary crowns and bridges and Vincent's infection. Apical infection, pyorrhea alveolaris and pulpless teeth may be of prime importance.

In rheumatoid arthritis, treatment of the gums and teeth should be undertaken as it would be had the patient no arthritis, with the following exceptions:

1. No (except emergency) extractions shall be performed during an acute exacerbation of an arthritis unless the patient is steadily becoming worse or is not improving after a reasonable period of time; i.e., one or two months.

2. In the case of undernourished, weakened persons, attempts shall be made to build up the general resistance and strength before extractions are performed.

3. Not more than one infected tooth

shall be removed at the first sitting, with a rest period of at least three or four days. If a flare-up of arthritic phenomena occurs after an extraction, a period of at least a week must be allowed before further extractions are performed. After the first extraction, two or three infected teeth may be removed at one sitting, but under no circumstances should more than four infected teeth be removed at any one time.

The dentist must remember that at present there is no pathognomonic test to determine infection of a tooth in the mouth. No dentist or physician can say with assurance whether bacteria are present in the periapical region of a given tooth regardless of the presence or absence of periapical roentgenographic changes. There is nothing to warrant extraction of pulpless teeth in a patient with rheumatoid arthritis any more than in a patient without arthritis. Unless there is a recent dental history related to the arthritic symptoms, pulpless teeth may be no more dangerous in the arthritic than in the non-arthritic. On the other hand, a negative roentgenogram of a pulpless tooth does not eliminate the tooth as a possible focus of infection.

The importance of parodontal disease (pyorrhea alveolaris) in rheumatoid arthritis has not been determined. It may be of great significance because (1) a large total area is usually involved; (2) trauma during mastication may force bacteria into the circulation; (3) slightly loosened teeth may act as pistons, forcing bacteria into the blood stream, and (4) severe parodontal disease may interfere with a dietary regimen. Considering the types and frequency of bacteria in the parodontal regions, parodontal disease should receive treatment because of the general improvement in health and resistance which may follow, and possibly because of its (unproven) exciting or aggravating rôle in some cases of arthritis.

There is no reliable evidence that dental focal infection may cause or aggravate rheumatoid arthritis. Although dramatic improvement (or an exacerbation of symptoms) may occasionally follow the elimination of dental infections, this is the exception rather than the rule. Dental infection in the arthritic patient should be cleared up as a general health measure, to lessen the load which the patient is carrying, and not to cure the arthritis *per se*. Above all, the patient must not be told that the arthritis will be improved because of elimination of the dental infection.

It is impossible to more than mention here several other important aspects of this subject: the harm that may be done to the arthritic patient by indiscriminate elimination of infected areas; the use of sulfanilamide, sulfapyridine, sulfathiazole and sulfamethyl thiazole in the treatment of certain types of arthritis and their local use in the mouth after extractions, in an effort to promote local healing and to prevent dissemination of toxic products, and the general and local care of the arthritic patient. These have been considered in detail elsewhere.[1, 2]

SUMMARY

1. Dental infection is to be treated with great care in arthritis, not primarily to cure the arthritis, but to lessen the burden which the patient is carrying; i.e., treatment is carried out as a general health measure.

2. Occasionally, symptoms in the patient with the focal-infection type of rheumatoid arthritis may be remarkably improved by removal of a focus of infection, but this is the exception rather than the rule.

3. The dentist must never raise false hopes in the arthritic patient by promising to relieve the arthritic symptoms by dental procedures. On the other hand, definite infection in the mouth should be treated, in general, as though no arthritis were present. Certain exceptions

to this have been mentioned in the text.

4. There is no reliable evidence that dental focal infection can cause or aggravate rheumatoid arthritis.

5. Parodontal disease may be as important a factor in arthritis as is periapical infection.

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PREVENTIVE DENTISTRY

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THE alimentary canal, which is about 30 feet in length, is lined throughout with specialized cells. Like the integument, this lining protects the blood stream against invasion by micro-organisms. In health, there are no breaks in this alimentary lining except at the upper end, in the oral cavity, where the continuity is broken by the teeth, each tooth making a separate puncture and, at the same time, "plugging" the break.

To insure against "leakage" into the blood stream, Nature forms around this tooth plug at the tooth neck a strong fibrous band. Interlaced with strong fibers of connective tissue and sheltered by the cingulum of the tooth, this band constitutes perhaps the most vlunerable spot in the entire body. It is rarely maintained in a state of health to middle life. Its very physical make-up invites trouble. Its crest is detached by nature and lies free. In health, this free margin is protective, but, because of our "civilized" habits, it may, through disuse, serve to retain bacteria-ladened débris, with the result that the gingival trough becomes diseased.

Whatever the cause, gingival disease is, next to dental caries, perhaps the most common of mankind. It is significant that the two most prevalent diseases of man should occur in the mouth and both be directly associated with the teeth. Indeed, so closely are they associated with the teeth that neither can exist when the teeth are missing.

It is little wonder, then, that the teeth are so soon lost, since they are the victims of the two most common diseases. To further complicate the matter, the causes of both caries and pyorrhea are unknown. Their beginning is almost never associated with pain.

Preventive measures will remain vague and indefinite as long as their etiology is obscure. Since we do not know the cause, treatment must, as in cancer, be symptomatic and as sane as possible.

With that in mind, let us revert to the tooth which is functioning, as it were, as a "plug" in this opening in the lining of the alimentary tract. How well is it doing its job, when, as often happens, at a light touch, the gingival tissue bleeds? If, when we washed our hands, there followed a flow of blood from between the fingers, would we suspect that something was wrong? Why the different attitude as regards the mouth lining? Does not the blood have the same source?

The dentist sees bleeding of the gums

Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

every day and it seems to cause him no more concern than perspiration.

As time goes on, the gingival trough increases in depth. Detachment increases, and if recession kept pace, no pocket would form; but the pocket develops and a real problem is presented. The picture changes from blood flowing to pus flowing.

Rather late, the dentist comes into the picture. If he follows the regular routine, he will press the gums and pus will ooze out. Next, he will pass the scaler through the pus, feeling for calcific deposits. If he discovers them, he will push them off and into the bony depths of the pocket. The bone around the pockets is found by Fish and others to be sterile. This may explain why, under such manipulation, the pockets continue to grow deeper.

When that part of the peridental membrane forming the gingivae becomes detached, the "seal is broken," and, at each point, a portal of entry to the blood stream is created. To further complicate matters, a sharp, horny deposit forms on the tooth surface. When we recognize the extent of this line of vulnerability, we begin to realize what a hazard to the blood stream it becomes when diseased.

It is not surprising to see the interest in focal infection shift from the pulpless tooth to pyorrhea when the large area of highly infected tissue in a well-established case of pyorrhea is considered. Many are the pulpless teeth removed with no improvement to the patient. Prompt and definite is the usual improvement following the cleaning up of a case of pyorrhea. It is surprising to see how many members of the medical profession hold the idea that a pyorrhea pocket is a superficial affair and therefore cannot be a focus of infection.

Oral hygiene takes on a new meaning when we understand that only by keeping this long gingival line clean can we keep it in health. If its care could be expressed in one word that word would be cleanliness. The Charters' method of brushing has proved its value for this purpose.

Instrumentation takes on a new meaning when we work along this line knowing that irreparable trauma and infection will follow careless work.

Have you any patients in your practice who have for the past twenty years come in regularly, four or more times a year, for a prophylactic treatment? If so, how is the gingival line? Has it receded to the bifurcation in the molar region? At each sitting, more fibers are severed, and perchance a deeper groove is cut in the cementum with sharp scalers or planes, which some operators insist on using. It is not a prophylactic treatment if irreparable injury results. It is not preventive dentistry.

This vulnerable gingival crevice should never be entered until it has been bathed thoroughly with an antiseptic of low surface-tension. A pocket containing pus should not be entered until it has been cauterized to the depth of the pocket, preferably with Howe's ammoniacal silver nitrate. This will serve not only to prepare the pocket for safe scaling, but also, to a surprising degree, to heal the pocket. This solution is proving to be equally effective in the control of pyorrhea as it is in caries.

How much good or how much harm is done depends on the care and intelligence exercised in the operation. Not enough thought has been given to this highly important procedure. Irreparable injury has resulted from trauma and from forcing highly infective material into the deeper structures. Shall the operation be disease-preventing or disease-provoking?

Nature gave the eyes a highly developed protective mechanism, both mechanical and sensory, which indicates that the eyes are a valuable adjunct to well-being. Likewise, the pulps of the teeth have a most highly developed protective mechanism, both mechanical and

sensory, indicative of the value Nature places on the vitality of the pulp in the struggle for existence.

The operator who deadens this sensory defense mechanism with an anesthetic in order to prepare a cavity in the tooth may be doing a real injury to the pulp. The use of anesthesia tends to make for rapid and excessive cutting, both of which may injure the pulp. The pulp must not only repair injury resulting from the use of an anesthetic, but must also resist irritation and tolerate a foreign body (filling), which often is of metal.

Some men will say "My patients won't allow me to prepare a cavity without an anesthetic." Almost without exception, my patients request me *not* to use it. Careful operating, with sharp instruments, in a dry tooth under the rubber dam, is the answer.

Injury to the dental pulp is not always immediate. The pulp is so resistant that it may tolerate an insult for years before it finally succumbs. All these years, it may be a "sick" pulp and possibly an unknown source of infection.

To practice preventive dentistry, we must make cavities as small as good procedure permits, having the well-being of the pulp uppermost in mind. The most sensitive tooth will often have an injured pulp, and the very case in which procaine is used is the exact case in which it should not be used. If I must choose between hurting my patient or injuring him, I prefer the safer course.

One of the prerequisites to good operative dentistry is the rubber dam. Yet how many injuries may follow its injudicious use!

The habit of ligating the teeth with silk ligatures to "hold the rubber dam up" is so injurious that it needs special emphasis. I need not recall how the interproximal septal tissues are attached to the cementum. When the ligature is drawn taut around the neck of the tooth, the tissue is sheared off, and in this silk-cut incision is the débris stripped from the surface of the tooth by the small hole in the dam. The pressure of the rubber and the ligature blanches the tissue, driving away the blood, Nature's only means of defense, and the patient is often kept in this condition from a half to one hour or even more. The tooth is literally "hanged by the neck," if not "until it is dead," until it is "dammed." Such a procedure is antithetic to preventive dentistry. This may explain why we so often see a pyorrheic condition following this irrational practice.

The ligature is unnecessary except in rare, unusual cases, and, in these, the tissues should be treated with suitable antiseptics both before and after operating. The method of inverting the edge of the dam to retain it and avoid leakage is so generally known that to repeat it here would appear unnecessary.

Advising patients to use dental floss is dangerous. The condition of the septal tissues in mouths where this silk has been used should be enough to convince any observing dentist of the irreparable injury which results. If the dentist himself is unable to pass this ligature without shearing the connecting fibers of these tissues, how, we ask, can he expect the patient to do it? The use of floss, on advice of the dentist, has been encouraged by drug and dime stores selling floss, until the custom has become almost universal. Dentists should cease this ill-advised custom.

It might not be out of order to consider testing for pulp vitality as a preventive measure. It is one of the most difficult and complicated problems that we have in all dentistry. Some dentists treat it as a very light matter. They take the response to thermal or electric tests as accurate and final. The truth of the matter is that we have no dependable tester, not even the bur. All tests are the measure of nerve reaction. All other tissues of the pulp may be broken down, almost liquefied, but there often remain

nerve fibers very actively transmitting sensations. In such cases, all tests fail. In one root may be dead pulp tissue with definite apical involvement, while the remainder of the pulp will be vital. This condition may continue for years. What value is a pulp test in this case? These unmanageable and unknowable conditions only emphasize the value of pulp vitality, and preventing dental caries is our first line of defense against pulp disease.

CARIES PREVENTION

We often hear the statement that more teeth are lost from pyorrhea than from dental caries. This may well be questioned for the reason that no estimate has been made of the number of teeth lost as a result of caries as the first cause and pyorrhea as the second. For instance, loss of a tooth brings about drifting of teeth, which later are lost from pyorrhea. How many proximal surfaces are lost from caries, with resultant disease to septal tissue and bone and a pyorrhea pocket resulting in loss of teeth all going back to caries as the first cause? How many operative procedures have so injured the periodontium that the teeth were later lost, the primary cause being dental caries? All this and more has not been reckoned with, nor could it be, when causes for tooth loss have been tabulated. If the history of all tooth loss could be written, dental caries as the exciting cause would, in my opinion, head the list.

Caries comes with the teeth and goes with the teeth. While some surfaces of the tooth crown are much more susceptible than others, none is immune. Only surfaces on teeth in immune mouths are immune.

It seems to be well established that foods are the controlling factor, that carbohydrates are the offenders, the chief of which is sugar. The question is not so much what we should eat as it is what we should not eat.

For twenty years, we have talked about protecting the teeth against disease with vitamins. After all this time, it is still a debatable question. All the milk, cod-liver oil, oranges, prenatal feeding prescribed, etc., would probably fail in a contest with the all-day sucker.

It appears to me, for the time being at least, that we must accept dental caries as the price of modern civilized life with its refined starches and sugars. The most practical approach therefore is an effort to control the local condition. If my patients had to rely solely on vitamins, toothbrushes, etc., and had continued to do so for the past twenty-five years, most of them would be free from dental caries because they would have no teeth.

Oral hygiene has had its day. The "clean tooth" myth is seldom mentioned except in ridicule. Vitamins are having their day.

Researchers have labored and the riddle is yet unsolved. Millions of teeth have been filled, and it is estimated that for "each cavity filled, six new cavities have developed." In the race with dental caries, we are losing six to one, not considering the short life of the average filling. When the filling fails, we are back where we were. In a large percentage of cases, filling the tooth only postpones, for a short time, the loss of the tooth.

The problem has grown to such proportions that dentistry can no longer hope to meet it. So great is the suffering and so enormous the economic loss that it constitutes a major public health problem. Even so, what shall the public do about it? There is no hope except through the endeavors of the dental profession, and the profession has no methods for successfully meeting the problem; but to take it out of our hands and put it into totally ignorant hands makes a bad matter hopelessly worse. The pity of it is that the brunt of the suffering falls on the innocent and helpless child. This is a great emergency, challenging the best

minds of not alone America, but all countries.

We should agree that methods of the past have very largely failed. A more effective method must be found; more prevention at less cost; one that will reach larger numbers of our population; one fitted more nearly to our limited man power; one applicable to the child, for it is here that we must extend our energies. Here lies our hope, for, as Phillips Brooks said, "The future of the race marches forward on the feet of little children."

It is no surprise to many men when we say that such a preventive measure is now in operation.

In searching for a method to disclose caries on proximal surfaces before a cavity had developed, we tried ammoniacal silver nitrate. At first, we did not reduce it, just put it on and waited for light to reduce it. We soon learned that it is better to reduce it immediately with eugenol. Thus it becomes a perfect disclosing solution; but the real surprise came when time proved that the great majority of the surfaces treated did not require filling.

The method consists in simply drying the proximal surfaces and applying the solution and reducing it with eugenol. Because the details of the technic have been repeatedly published in the past, I shall only touch on them here. It might be well to stress a few points which time has proved to be important.

As in all other diseases, the remedy should be applied early. If the condition has progressed to the point of cavitation, if the decay can be felt with the explorer tine, and can be seen in the x-ray film, it is too far advanced to expect the best results from this treatment.

Have we not struggled with this disease long enough to realize that fillings are not the answer? Do not our results justify the conclusion that cavity hunting is absurd if we expect to prevent the cavity? To inspect a tooth crown for caries and consider only those which have cavities is comparable to examining the lungs and considering only those in which there are cavities as tuberculous.

Only recently, there has been a wave of renewed interest in the "cavity hunting" method to determine caries incidence. What an effrontery to those men who realize the enormous amount of invisible etching which is revealed by this simple disclosing technic! A trial should convince the dentist that he is overlooking many lesions of incipient caries.

Cavities are definite evidence that there is well-advanced dental caries; so far advanced in fact that we must fall back on the old method of mechanical filling—a method tried and found wanting. It is too slow and expensive to meet the situation. It is economically impossible to meet it: we do not have the man power.

So whether we like it or not, we are driven to some plan to discover this disease in the precavitation period. This period usually covers a number of years—years when it may be disclosed and arrested, before surface continuity is lost. The man who persists in searching blindly for proximal caries with his eyes, and feeling for holes with the explorer only, is not practicing caries prevention; nor can he, for the simple reason that he is looking for surface breaks calling for fillings; and let me repeat that fillings are not the answer to caries prevention. He overlooks the fact that all caries, except pit and fissure faults, begins in an etching of the surface; that this surface etching is invisible, and that it grows progressively deeper and deeper until the surface is broken and cavitation develops. It starts slowly and increases, as it were, by mathematical progression. It slows up only when it reaches the sclerotic dentin laid down by Nature to protect the pulp. This may check it for some time, depending on the thoroughness with which Nature has laid down this protective

layer. If the caries is of the white, rapidly developing type and Nature fails by not having the necessary time to complete her work, the pulp is involved early and is lost.

No man believes more in the value of the x-rays than I. By that, I mean full-mouth roentgenograms, including bite-wing films; but we must know and recognize their limitations. We all recognize their value in locating hidden cavities in the proximal surfaces; but these surfaces should be treated before these etched areas have broken down and cavities have formed. This means, in other words, that these surfaces must be dried and treated soon after the teeth have erupted and formed contacts with one another. The x-rays will not disclose etchings, so we must treat these faults before there is loss of tooth structure sufficient to be disclosed by the x-rays. The x-rays will not disclose beginning caries on any surface of the tooth crown, proximal, occlusal or gingival. Therefore, if we are to practice preventive caries, we must treat these surfaces during the etching stage and before the condition is apparent in the x-ray film; in other words, while the caries is confined to the surface and before there is loss of surface continuity.

When these surfaces are dried and this solution is properly applied and reduced with eugenol, there will be deposited in the interstitial spaces of the etched surface a black residue (the albuminate of silver), which is insoluble and does not wash or wear away. It is long-enduring and bacteria will not attack it. In highly susceptible young patients, the applications should be more frequent.

About fifteen years ago, we became very enthusiastic about applying this nitrate of silver solution in pit and fissure faults and reducing it. We believed that we were arresting caries in these faults. Later, we learned that many of these areas continued to decay. The reason is that these teeth frequently begin decaying at the dentino-enamel junction, and the solution does not penetrate to that point. We still use it in these faults, but not to prevent caries. The black residue definitely discloses the length of the faults, and when the tooth is filled, no difficulty is experienced in including all the faults within the cavity outline.

Fillings are the only satisfactory means for dealing with pits and fissures. I believe in and practice filling them early, if possible in the pre-carious stage—prophylactic odontotomy.

I have discussed the use of this solution for disclosing invisible proximal caries and arresting surface caries. I wish now to discuss some of its other valuable uses.

It has a wide range of usefulness in caries of the deciduous teeth. It is now common practice with many dentists to chip off the overhanging enamel of deciduous cavities, clean out the soft decay, dry and apply this solution and reduce it with eugenol. These teeth seem to stop decaying and most of the pulps remain vital. The teeth are exfoliated in their normal manner, with no fillings. This may prove the answer to the problem of care for large groups of indigent children. I have employed it for children in well-to-do families.

I have already mentioned its use for pyorrhea pockets. And why it is superior to other coagulants? Because it has its most beneficent effect on the denuded cementum, which forms one wall of the pocket. It reduces the hypersensitiveness of denuded cementum.

Putting a pellet of cotton saturated with the solution under the gum flap of an erupting molar hastens eruption and checks any infection that develops in such pockets. It will slow up cavity formation in the pits and fissures of the erupting molar until such time as they can be filled.

In an article written several years ago, I stated that gingival cavities could not be successfully controlled with this solu-

tion. We now know that they continue to decay because we did not get them sufficiently dry. Then, too, we did not remove any of the soft caries. We expected too much from one treatment. If these teeth are re-treated and more of the caries is removed at each treatment, they will stop decaying and be comfortable in the majority of cases. Because of the black stain, the treatment is not indicated where the cavity is visible.

Now I come to another of its valuable uses. Do not confuse this with any before mentioned here. For this purpose, it is no new experiment, having been used by Percy R. Howe, by me and by many others for more than twenty years.

We have heard much about the "dental cripple." I would say the loss of the first molar is a case in point. Since my subject is "preventive dentistry," I think that saving these teeth is apropos. Now you are about to ask me, "How are you going to save them when the patients do not come to the dentist until the teeth have ached for a whole night or more?" I shall attempt to answer it. Relief of pain is perhaps the surest incentive to consult the dentist.

In comes the tearful child, and if all we know is to extract the tooth, we are turning our offices into factories for making dental cripples. The child, in all probability, has pulpitis. The cavity is flushed out with warm water, with considerable force. If it is a case of true pulpitis, inserting a pellet of cotton saturated with cold water will increase the pain.

Cotton rolls are placed on each side of the tooth and the cavity is packed with dry cotton. The cotton is removed and a small pellet of cotton saturated with Howe's solution is placed in the tooth. This is allowed to remain a few seconds and is followed with a piece of cotton saturated with eugenol. About nineteen out of twenty times, the pain stopped in about ten seconds after Howe's solution was put in the cavity. The cavity is filled rather tightly with the cotton saturated with the eugenol and the child is asked to return the next day. At this second sitting, the cotton is removed, and, if necessary, a little of the overhanging enamel is carefully chipped off for greater accessibility. This is not often necessary. Now, the cotton rolls are placed on each side, and, with a rather large, round bur (not a spoon excavator), the black area of dentin resulting from the previous treatment is carefully cut out. If toothache develops again while the dentist is working, the previous treatment is repeated.

A small piece of cotton saturated with eugenol or some zinc oxide and eugenol is left in the bottom of the cavity. Soft treatment cement is allowed to flow over it and the surface is trimmed to occlusion. The treatment cement should be soft to avoid pressure. This is allowed to remain for a few days or a week. At the third sitting, the operator can work with less pain and remove a little more of the black carious dentin. This is an important step in the procedure. We may leave too much carious dentin and fail to sterilize all of it. We may remove too much and involve the pulp. The organic matrix of the decalcified dentin is often an asset in preserving pulp vitality. It is well to place a little zinc oxide and eugenol in the bottom of the cavity at this sitting and cover it again with treatment cement. I often leave this third treatment in for a month. And why so long? We are working from the cavity side and Nature is working from the pulpal side, laying down protective, sclerotic dentin, and she requires time.

At the next sitting, it should be possible to place the rubber dam and remove with a sharp round bur all the black stain on the lateral walls, leaving a black base over the pulp hard enough to be burnished with a ball burnisher. If the child has toothache when we begin working (which is not often the case), we should stop and repeat the treatment as before,

except for placing the zinc oxide base in the bottom of the cavity, which is not often necessary. If treatment cement is inserted and allowed to remain for from one to six months, in all probability the vitality of the pulp will be preserved.

I have described this case of pulpitis at some length. The ordinary case, without pulp involvement, many times requires but one or possibly two treatments.

Whether a cement base is necessary when the permanent filling is placed can be determined by the response to a blast of cold air. If the pain is definite, a cement base is placed. If not, amalgam is placed on the black treated base. The black dentin is not allowed to remain on walls from which a shadow would be cast. After the filling is placed, the tooth should be as bright as if there had been no stain. With thorough drying and repeated treatments, the solution will penetrate to the full depth of the caries. This can never be learned by working solely in the mouth: it must be learned by treating and sectioning extracted teeth.

No trouble is experienced with anterior teeth, which are treated in the same manner as the posterior ones, with care to cut out all black tissue that casts a shadow, leaving only that over the pulp, with a little oxyphosphate cement spread over it to prevent a shadow through the silicate.

Pulpitis was a problem until experience revealed what this solution would do. We were taught that one wakeful night meant the loss of the tooth or at least loss of the pulp. This solution seems to solve the problem. Many men, including the essayist, apply it directly to exposed pulp horns in permanent teeth and all report excellent results.

There seems to be a difference in pulps of permanent and of deciduous teeth. At present, the general idea is that this solution should be used cautiously in exposure of deciduous pulps.

Clinical experience demonstrates that applying it to exposed pulps in permanent teeth is a safe procedure. It is indorsed by such men as Percy R. Howe. The horn of the pulp is cauterized and the cavity sterilized, to get rid of the organisms and their toxins and acids. This procedure is employed in preparation for a surgical operation, and that is what a pulp capping is. It is the consensus of opinion that if loss of the pulp occurs, it will happen in spite of use of the Howe solution and not because of it.

It has been demonstrated that pulps of teeth with deep caries are invaded with bacteria; but this does not constitute infection in a strict sense. When these organisms break down the resistance of the pulp, we have true infection. Often the exposed pulp horn has been so badly invaded that it has become definitely infected and is being broken down. Howe's solution seems to have the ability to sterilize the infected horn by transforming the broken down protoplasm into silver proteinate or silver albuminate. The remarkable recovery of these pulps is based on this hypothesis.

What factor in Howe's solution makes it unique? Briefly, its protein cleavage. In addition, its hydrogen-ion concentration is high and it therefore permanently neutralizes the acid of caries. Its action is rapid and its results are long enduring. Eugenol is the ideal reducing agent because it does not harm the pulp and it produces no irritating acids. What could be more practical today than a proved method for saving the pulps under thousands upon thousands of leaky inlays and fillings? Such management of deep-seated caries is encountered almost daily. Too often, to remove it means a pulp exposure. Why not use Nature's covering by treating it in this simple manner, and leave it undisturbed?

The keynote in the use of this solution, both in deep-seated caries and in surface enamel etchings, is expressed in the word "dryness."

Howe's solution has proved its value

beyond question for disclosing invisible surface caries. Its ability to thus arrest caries appears to be quite well established. Also, it is effective for sterilizing areas of deep-seated caries with and without pulp involvement. I have found that those who oppose its use for the foregoing purposes are those who have had no experience with it. There is rapidly developing an opinion that it is our most valuable agent in the practice of preventive dentistry.

Most disfiguring fillings and bridges in the front of people's mouths had their inception in invisible etchings on the proximal surface, which, it appears now, could have in a large measure been prevented with this treatment had it been applied during childhood. I have yet to find a man who has used it along clinically well-established lines who says that it is not effective.

It should not be placed in cavities in the front teeth unless the teeth are to be filled within a few days, at which time the black stain will be removed in the preparation of the cavity. It is very unsightly until the fillings are made. Also, it should not be allowed to touch porcelain inlays, silicate fillings or checks in the enamel.

It is of the greatest importance that we develop a new concept of incipient caries. We must think of it as we do enamel rods. We deal with them daily, yet we never see them. We never prepare a cavity that we do not sever enormous numbers of dentinal fibrils, yet not one of us ever saw a fibril, except through a high-powered microscope. Every day in almost every mouth, we are working over areas of incipient caries, and we see it no more than we do the enamel rods or the dentinal fibrils. The etchings of surface caries are of the same scale of smallness and invisibility, yet they are just as real as an enamel rod, a dentinal fibril or a blood cell.

As many cells are invisible microscopically until they are stained, so are the interstitial spaces in the etched enamel surface. How fortunate that this simple staining not only reveals, but also arrests the carious action!

Millions upon millions of proximal surfaces of young people's teeth are in need of this simple, effective treatment.

"Truly the harvest is great, but the laborers are few."

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A STUDY IN ETHICS AND ECONOMICS PERTAINING TO THE FIELD OF COMPLETE DENTURE PROSTHESIS

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FOR the past twenty-five years of my professional career, I have devoted myself assiduously to the study of the many problems involved in the construction of complete dentures and in the teaching of the technical and clinical procedures of complete denture prosthesis. As the result of this study, I have reached certain specific conclusions pertaining to both the ethical and the economic phases of this particular branch of health service, in which, I feel confident, most of you are vitally interested.

Since there are many angles from which a discussion of this subject can be approached, it seems fitting that some of these be enumerated. I shall discuss this matter first from the point of view of the general practitioner, next, from the perspective of the prosthodontist or specialist. Then I shall consider the attitude of the commercial laboratories and their various organizations, and finally, throughout the entire discourse, I shall endeavor to place proper emphasis on the need for keeping the patient's viewpoint in mind.

Read at the Fifteenth Annual Greater New York Dental Meeting, December 7, 1939.

As members of the dental profession, you will agree with me that complete denture prosthesis is definitely an important part of that health service which we, as trained and licensed dentists, render to society or, more specifically, to our patients. I assume, further, that it is your aim and mine to render this service not only to the best of our respective ability, but also in accordance with that professional standard or code of ethics that we subscribed to when we were admitted to our professional organizations.

As general practitioners and members of organized dental societies, you need not be told that there is an economic phase to the practice of dentistry, for this fact has confronted you from the beginning of your dental career and you will be compelled to face it as long as you continue to practice.

It was not so many years ago that dental schools were often criticized because of the failure of their faculties to place a proper emphasis on the economic phase of dental practice in the presence of their students. Perhaps some of this criticism might have been justified had the conditions prevalent in those days

been more like those which exist all about us today. Be that as it may, to me it seems that the present tendency is to swing the pendulum too far to the other extreme. This may not apply so much to the dental schools as it does to the activities of many of the dental societies in our larger centers of population.

Of course, we cannot ignore the fact that a dental education costs considerable money, and that office equipment and upkeep, and personal and domestic necessities, are items that must be given a proper place in our budgets. But have we not overemphasized the so-called business side of dentistry at the expense and apparent neglect of the ethical and more humanitarian code of professional practice?

From time to time, during the past quarter of a century, the members of our profession have been given many opportunities to take special courses of training in business efficiency and practice management. These courses have been advocated as a means of increasing individual incomes. Now, courses of this nature are being given in all parts of the country, so that, wherever a sufficient number of prospective students can be found, there a course in business efficiency and practice management is established. In addition to these endeavors, some of our dental schools now give rather comprehensive courses in dental economics and management to their undergraduate students.

It must be admitted that courses of this nature possess a distinct merit. If, however, we will take time to read the reports issued by the U. S. Department of Commerce on the "Economic Conditions in the Dental Profession" for the period of 1929 to 1937, we will discern that no phenomenal increase has been reported in the incomes of the general practitioners during these years, and that the average income for the year 1937 was cited as less than $3,000. Later in this discussion, I shall refer to this fact in relation to the cost of producing dentures and the fees charged patients for this type of service. There are many factors in this problem that affect the practitioner in his relation with his patients, some of which belong strictly to clinical and laboratory procedures. They will of necessity be treated as such.

Many states have special legislation governing the practice of a specialty in dentistry, while others contemplate making changes in their present laws to require special training and examinations. It is a known fact that some men who classify themselves as specialists do so purely on their own assumption, without having obtained any special degree or license. This is a condition that can be neither denied nor altered. Beyond the inherent desire of the individual to conduct himself in accordance with the accepted standards of the ethical practices and the regulations prescribed by the respective state boards of registration, no control over his behavior can be exercised.

It is this inherent desire on the part of some of these men of outstanding ability to render to all their patients the highest type of professional service, irrespective of the patient's economic status, upon which many an edentulous cripple must depend for the alleviation of his suffering. All too frequently, the denture specialist lacks that humanitarian trait which prompts him to give patients of limited financial means the same service rendered to the affluent. It is not the specialist alone who errs in this capacity; the general practitioner is often found guilty of neglecting his impecunious patients. At least, a goodly portion of them feel that, like the proverbial laborer, they are worthy of their hire.

Unpleasant as it may seem, we are faced with this problem, which we should approach as one of research, examining closely the methods of rendering professional service, and, at the same time, refraining from discussing the economic

phase. Then we could see this whole problem in a different light. As a result of such a study, we would all develop an entirely different concept of it, and would change our attitude favorably toward all types of prosthetic work.

When we learn to look upon denture prosthesis as an integral part of health service, we shall soon recognize it as a creative art; an art that enables us to restore the function of mastication to the edentulous patient, to restore his lost facial dimension and appearance and to correct any speech defect resulting from the loss of his natural teeth.

I say this with emphasis, for it is only with this high concept of our calling in mind that we fully appreciate its significance and realize what our true mission is. If, as general practitioners or as specialists, we strive at all times to improve our aptitude and skill, we shall all be better prepared to serve our patients in accordance with the highest standards of our profession. With this as our chief aim, we shall be in a position to approach the economic phase of this problem with a far better understanding of it than most of us possess at the present time.

To elucidate the foregoing, I would say: First, we must possess a comprehensive knowledge of the form and function of the human mechanism of mastication; secondly, we must understand its relation to bodily metabolism in order that we may be able to correctly diagnose and advise upon the conditions of the mouths of our patients; thirdly, having acquired the necessary ability to fabricate complete denture prostheses, we must create and develop within ourselves a desire to give to our patients a finished product that is the result of our patient care and sincere effort.

I have participated in discussions of these or similar problems and have reacted as you are now doing perhaps. Stock phrases were encountered on these occasions, in gatherings large and small, as follows: "Oh, yes; those are, indeed, worthy ideals to which you have referred and they should, of course, be striven for, but—." Then each dentist in the group gave his reason why he could not aspire to these ideals. One would say, "I could never get my patients to pay me if I tried to make dentures to those specifications. It would take more time than I can give to this kind of work." Another would say, "We have so much competition in our town that we have to be satisfied with rather low fees." These and similar excuses were offered to prove that the best work cannot be done in their communities.

Try as we may, we cannot exclude the economic phase of dentistry from the discussion of perfect health service. Before we attempt to discuss any method for determining fees for denture prosthesis, it is necessary that we devote a few moments to a description of the clinical and laboratory procedures involved. It is a well-known fact that, in most of our undertakings, a systematic, well-thought-out plan of procedure is a prime essential. This axiom certainly applies to all phases of prosthetic dentistry.

The first step in the clinical procedure is the procurement of the case history. This information, when properly tabulated, together with the findings of the examination and diagnosis, will enable the operator to more fully comprehend the conditions confronting him, and, as a result, he will be able to make a more intelligent prognosis and to better outline his treatment plan.

Prognosis *per se* is, in the case of most edentulous patients, anything but a simple task. It is always better to be conservative in telling the patient how much he should expect from prosthetic dentures. A slight understatement will result in considerably less friction than any glowing reference to one's own ability. It is far safer to make conservative promises than to promise more and subsequently find oneself "short" when the time comes to deliver.

It is in the contemplation of the actual clinical and laboratory procedure that an outline will be found most helpful.

To formulate a definite plan of procedure for all future visits not only conserves time, but also obviates deciding, in the patient's presence, upon the materials to be used. Not only should treatment outlining be made a routine procedure, but it should also be recognized as one of the rudiments of efficient practice.

A courteous manner of approach upon the first visit of the patient is of utmost importance. While it is essential that every dentist make rules in regard to appointments, these rules should be stretched considerably in regard to the initial visit of the patient. Do not send him away without a diagnosis, to call another day upon appointment.

A casual examination and preliminary impressions take but five or ten minutes, and they will convince the patient that we are interested in his case and considerate of his time and ours. A conversation on the necessity of an appointment might easily take up twice as much time or more. After this early examination, study casts can be made, individual trays can be prepared for the taking of the second impressions and a more comprehensive diagnosis can be made at the next sitting.

A competent assistant may look after the necessary details in the preparation of materials and such laboratory work as the making of casts, etc. Proper preparedness will offer many advantages in the performance of all subsequent operations, whether these be performed at the chair or in the laboratory. A further benefit derived from early planning, by those operators who do their own laboratory work, in which they follow a systematic routine, is the fact that an increased amount of work may be accomplished within a given period of time with a minimum of effort and fatigue.

Just as the oral conditions of patients show many variations, so many variations have developed in impression taking and other clinical procedures. The able diagnostician, because of his particular ability, will be in a position to judge, and prepared to employ, those materials and clinical practices that will attain the best results in all cases. He will always employ the simplest procedure which his experience has proved the best one to meet the peculiarities of the case in hand.

Suitable impressions, having been obtained, are boxed-in, and stone models are poured into them. Base-plates are then made of resinous shellac, vulcanite, metal or a synthetic resin. I prefer those made of acrylic resin because they are simple to make, light in weight and quite rigid and retain their color permanently. Because they ultimately become a part of the denture, their cost is by no means prohibitive. While this material is somewhat more expensive than vulcanite, the extra cost is more than offset by the time saved in the use of it. It requires only a fraction of the time needed to make vulcanite bases.

When the base-plates have been trimmed, it is well to pour casts of plaster into them, which will be mounted on the articulator to support the bases after the positional relation records have been obtained. Instead of attaching an occlusal rim to the maxillary base, I have adopted the method of setting the maxillary teeth tentatively onto the base-plate, and I find that this not only saves considerable time, but is otherwise advantageous. For instance, the teeth thus set can be tried in and checked to see whether their color, size and mold are best suited for the particular case. Furthermore, the arrangement can be modified easily to comply with every esthetic need. This procedure will actually be found to consume less time than that required to correctly contour an occlusal rim, and to scribe the median line and other landmarks, such as the high and low lip line and the positions for the cuspid teeth. A rim, prefer-

ably of modeling compound, is attached to the mandibular base-plate.

With base-plates prepared in this manner, the procedure of restoring the lost facial dimensions and contour can be accomplished in an amazingly short time. It is necessary, of course, to see that the base-plates fit and cause the patient no discomfort; to develop an occlusion of the mandibular rim with the maxillary teeth, an occlusion that will incorporate an acceptable vertical dimension of the denture space, and, lastly, to check and modify the contour as may be needed. This whole procedure can be carried through in less than ten minutes.

When a satisfactory restoration has been attained, the positional relations of the denture space to the condylar axis should be registered with the facebow. Records of centric and protrusive relations must also be obtained. With the aid of these three records, the casts with their respective base-plates should be mounted on the articulator, and the controls on the instrument adjusted and set to establish the mechanical equivalent relations on the articulator. When this is finished, the setting of the teeth is completed and the model dentures are tried in and checked for compliance with all esthetic and functional requirements. Following this the dentures are processed and polished and are once more tried in. Before they are finally delivered to the patient, they are spot ground and milled in with abrasive paste, to establish a perfectly balanced articulation; after which, they are serviced for a period of from thirty to sixty days, depending on the needs of each individual case. This whole procedure which I have just described is naturally subject to considerable variation. We all know that each individual operator works in his own particular manner and frequently develops a technic all his own.

The next point I wish to emphasize is that it is not only necessary for one to know how to make dentures well, but also it is important that he know how much time will be consumed in the process, and that he understand how to estimate adequate compensation for his work. It has been stated often that a practicing dentist averaging seven hours a day in his office can actually count on only 1,000 hours a year as truly productive. If, then, he is to derive a net income of $3,000, he must set his fee high enough to insure this and to cover all other items of expense and overhead, including material costs. When this has been estimated, it will be necessary only to divide the amount of the budget by the number of productive hours to determine minimum fees that will insure a gross income ample enough to cover all the items included in the budget.

Important as the matter of fees may be, more important still is the output of work in a given time. I am firmly convinced that most general practitioners devoting part of their time to denture prosthesis could reduce the time expended on the construction of an upper and lower denture very materially by adopting, and following, some definite routine. They can, I believe, do this without sacrificing any of the quality of the service. It is unnecessary to make a grinding task of denture work. The fees for this service, in relation to time and effort expended, compare favorably with just fees of any other type of dental service.

I should not fail to mention that there is a compensation greater than the mere monetary one in denture prosthesis as well as in other types of work. Every deed well done has its reward in satisfaction to the doer. As we attain perfection in our denture work, we gain inspiration and impetus to carry on.

In the field of denture prosthesis, we have concentrated too heavily on the money to be made rather than on effective service to the patient.

Recently, we have heard and read a great deal about panel dentistry, about

the high cost of medical and dental care for the low-income group, and about dental service for those who are on the relief rolls. This important phase of dental economics is being discussed at dental society meetings, and it should be given careful consideration by every one of us, lest we fail in our duty and have the prerogative of helping the indigent and the lower income group taken away from us.

It is true that a great number of our patients belong to that class known as the white collar group. Many of them have to economize in various ways in order to pay for the dental service that they need. What we, as a profession, can do to make the cost of our service meet the pecuniary circumstances of the patient deserves our earnest attention.

One thing which will do much to improve complete denture service and reduce the cost of production is a renewed interest of the general practitioner in doing his own denture work. Judging by reports from various parts of the country, there is no time like the present to drive this advice home. Many practitioners say that their time is not fully occupied. If these men would return to the practice of doing their own laboratory work, instead of delegating it to the commercial laboratories, they would be amazed at the improvements in materials and equipment now available. Because of this, the purely technical procedures are much easier to perform and the time element is not such a factor as it used to be. Since the advent of the acrylic resins now used in the making of

OUTLINE OF CLINICAL AND LABORATORY PROCEDURES TO BE FOLLOWED IN COMPLETE DENTURE PROSTHESIS

	Time Hours
1. Case history.	
2. Mouth examination and diagnosis.	
3. Preliminary impressions and study casts.	1
4. Prognosis.	
5. Tooth selection.	
6. Preparation of individual tray for second impressions.	½
7. The second impressions.	1½
8. Boxing-in the impressions and pouring the stone casts.	¼
9. Making the wax patterns for and converting these into permanent base plates.	1½
10. Pouring the mounting casts, and attaching an occlusion rim to the mandibular base plate.	1
11. Setting the maxillary teeth tentatively.	
12. Registering an acceptable vertical dimension for the denture space and restoring lost facial contours.	½
13. Registering the positional relations of the denture space to the condylar axis, mounting the casts on the articulator and adjusting the instrument in compliance with individual needs.	½
14. Making corrections in the arrangement of the maxillary teeth and setting the mandibular teeth tentatively.	½
15. The first "try-in" of the wax model dentures.	¼
16. Processing the maxillary denture.	2
17. The final "try-in."	½
18. Laboratory corrections of tooth arrangement and processing of the mandibular denture.	2
19. Checking the fit and positional relations of the processed dentures in the mouth. Spot grinding and milling in of the occlusion. Inserting the dentures, and instruction to the patient.	1
20. Adjustment service during the initial period of use.	2
Total	15

dentures, we no longer have to combat the grime of former days.

If we should make a comparison between the dentures made wholly by the dentist, and those set up and processed by most commercial laboratories, we should find that our own work is more satisfactory to the patient and a source of greater pride to us. It will not be necessary to charge the patient more for work done in our own laboratories than for the dentures manufactured in the commercial laboratories. The value of our time and the cost of the denture made outside are analogous, but with added remuneration for our time which might otherwise be wasted. We are not considering in this discussion inferior appliances, materials and methods, such as the use of the plain line articulators and the mush bite procedure of registration, for the obvious reason that they are not up to present-day standards.

I am not unmindful that some of the statements which I have made are highly controversial, particularly those pertaining to our dependence on the commercial laboratories. There is abundant opportunity for argument here. Undoubtedly, it is true that many men in the profession would find it extremely difficult to do their own laboratory work, since they have always delegated to the laboratories all operations which did not actually demand clinical or chair procedure. As a result, they have lost much of their earlier technical ability, not only in their laboratory work, but also in their clinical operations.

Many of the flagrant violations of our dental practice acts on the part of the commercial laboratories undoubtedly had their origin in the unwillingness of some dentists to do their own impression taking and the contingent laboratory work. Perhaps they did not receive adequate training in denture prosthesis. Contrary to the opinion of some of my confrères, I believe that the undergraduate student in dental schools should be expected to do the laboratory work necessary to the construction of denture prostheses, even though he may ultimately find it advisable in his own practice to delegate some of this work to a technician in his own or some other laboratory.

As a profession, we are responsible for the existence of the dental laboratories. When properly conducted, they may continue to serve us in doing purely technical operations, for which it will be unnecessary to enact additional legislation. The laws of most states clearly define the practice of dentistry and stipulate who shall be entitled to practice and, by implication, who may not.

There is no immediate danger that the men who depend on the commercial laboratories to do their prosthetic work will be denied this service. But are we, as members of the dental profession, going to close our eyes to the malicious practice of some of the licensed practitioners who call in laboratory technicians to take impressions and to perform other clinical operations? Are we going to permit the lazy and the uninformed to establish a policy detrimental to the profession?

On the basis of my personal observations and tabulations made over a period of years, I have prepared the accompanying outline of the clinical and laboratory procedures involved in the construction and servicing of complete denture prostheses. I have also indicated the approximate time consumed in the various operations by dentists of average ability.

This or an outline somewhat similar, if followed systematically, will help the practitioner to better coordinate the various phases of his denture work. A record of the time consumed may help him materially in determining his fees, but it should at all times be remembered that the time element is but a single factor in the proper conduct of a professional practice.

311 East Chicago Avenue.

NEW FINDINGS IN THE HISTOLOGY AND PATHOLOGY OF HUMAN ENAMEL

By Joseph D. Berke, D.D.S., New York, N. Y.

THE dentist who has attempted to keep abreast of the numerous studies on the incidence and control of caries and concepts of the enamel has undoubtedly found himself in a quandary. There is a continuous stream of conflicting results presented in the literature. Up to comparatively recently, the enamel was considered to be a totally inert substance that can be affected only by local surface changes. This conclusion was based on the work of J. Leon Williams (1896), who completely discredited C. Heitzman (1883), C. F. W. Bodecker (1894), F. Abbott (1880) and G. W. Weld (1886). They were of the belief that the enamel did contain an organic matrix, but were unable to prove it.

To the majority of students of this subject, caries is a phenomenon whereby bacteria produce an acid that dissolves the enamel. In experimental work on rats, another local factor was observed. Coarse particles in the diet were found to produce caries.[1, 2] In accordance with the findings of this school, factors such as faulty mineral metabolism, deficient diet and even pregnancy[3] cannot affect the enamel.

Among the numerous papers that propounded the theory of the "vitality" of the enamel, there often has been an equal misunderstanding of its histology and physiology. With the many worthy papers on nutrition and calcium metabolism came the commercial enterprise of flooding the profession with literature to foster the sale of pharmaceutic products. Recently, a "remineralization powder" has been advertised. Many papers have appeared by men far from the realm of dentistry. Some have made notable contributions. Others have not the vaguest idea as to what dental decay looks like.

One of the fundamental causes of failure in our studies has been the separation of research from clinical observation. The practitioner has been overawed by scientific terminology. Statistics have also added considerably to the confusion. Greatly divergent results were obtained under similar conditions. In practice, we have been too concerned with technical achievements, many of which are unsound, because the microscopic structure and nature of the tissue have been overlooked. There is no structure in the body that is subjected to operative procedures with such frequency and is as little understood as the enamel of the teeth.

The quantity of organic matter in a calcified tissue is an indication of its physiologic activity. The chemical determination of content by weight has established the fact that bone has the greatest percentage of organic matter (34 per cent). Cementum approaches bone in nature. Dentin is about 28 per cent organic. Experimental studies by a host of workers have established the ability of bone to undergo change in response to physiologic and pathologic processes. A factor in its ability to respond and the rate at which it progresses is the area of surface of bone that is in contact with the surrounding and enveloped connective tissues. Cementum has a large surface area and also shows activity in growth and resorption. Dentin is active in the

From the Hospital for Joint Diseases.

production of secondary dentin and the accretion of calcified tissue, which constricts physiologically the pulp chamber and canals. It is decidedly less prone to change in that the area of surface in contact with the pulp is small and the pulp is a specialized tissue. However, this does not prevent tissue change of minute proportions.

Human enamel is the most densely calcified substance in the body. Chemical determinations usually place the inorganic content at between 95 and 97 per cent. It is difficult to conceive that a substance so inorganic should have an organized structure of any consequence or regularity. When this tissue is studied with the usual microscopic technic, it becomes evident that there is no organic residue in the decalcified specimens. The absence of even traces of such substance has led to the belief that retention of such matter would be an irregular occurrence in the process of calcification, rather than an integral part of the enamel development.

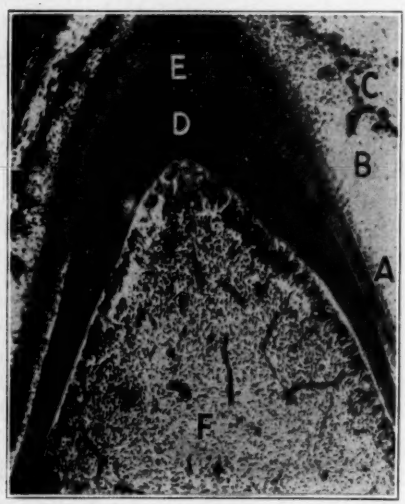

Fig. 1.—Decalcified section of forming tooth. A, ameloblasts. B, stellate reticulum. C, outer epithelium. D, dentin. E, enamel. F, dental papilla. (16 mm. obj.; ×10.)

The prevalent concept of the enamel as understood by the practitioner and as taught in almost all dental schools is that the enamel is a dense, inorganic mass having a minute organic content that is of no consequence histologically.

The specimens that are studied are ground sections. These are segments of teeth that were worn thin by rubbing against a ground glass moistened with pumice and water. The enamel is found to consist of columns of mineral matter separated by a cement or interprismatic substance. In general, the rods are perpendicular to the dentino-enamel junction. On the occlusal surface, gnarled enamel is found. Other structures seen are striae of Retzius, Nasmyth's membrane, spindles, tufts and bands of Schreger. The latter are alternate light and dark stripes seen when enamel is viewed in reflected light. Striae of Retzius are seen microscopically as brownish bands corresponding to various stages in the formation of the enamel cusps. C. F. Bodecker (1905) described lamellae as irregular lines of varying thickness running from the dentinal tubules to Nasmyth's membrane and following the direction of the rods. He also described "tufts" as aggregations of organic matter caused by the thickening of the sheath and cement substance at the expense of the rods. By decalcification of pieces of enamel with acid celloidin, he retained the "enamel rod sheath," which he believed was the partially calcified wall of the ameloblast. Areas where the rods were not in close apposition were filled with a cement substance in which the organic matter predominated.

In a previous publication,[4] I demonstrated that the enamel is a calcified tissue. It is not a mineral deposited in the body, but is similar in nature to bone, cementum and dentin. It is unique in that the formative organ has degenerated to a thin surface membrane. The only possible relationship to the rest of the body is in the supporting dentin.

The technic used in the study of enamel and of concretions found in the mouth[5, 6] and urinary tract[7] included complete decalcification and simple embedding in celloidin. The average specimen was cut at 10 micra. The amount of enamel matrix varied from the entire enamel cap to isolated fragments. Bone and gum tissue, and even the pulp, could be retained in the same specimen. Hematoxylin and eosin were the most satisfactory dyes for differentiation.

Microscopic study revealed a delicate organic matrix that permeated the entire mass of enamel. Just as bone, dentin and cementum consist of a distinct organic matrix about which is deposited calcific matter, so enamel presents a similar ground substance. There is no part of the enamel that does not contain organic matter. As it is distributed, so are the structures of the enamel formed.

The matrix consists of columns of organic substances, which are the decalcified rods. They are separated by the cement substance. In some types of enamel, the segmentation of the rods is clearly visible. In normal enamel, the outer portion of the enamel crown is stained faintly. The dentinal segment shows alternate light and dark columns of rods that I have called "alternate bands." They arise at the dentino-enamel junction and are directed perpendicularly toward the enamel surface. The dark staining bands contain more organic matter than the lighter ones. In reflected light in ground specimens, they have been described as an optical phenomenon, called bands of Schreger. These structures show such variation in light refraction because of differences in organic content and calcification. In thick sections, especially in gnarled enamel of the occlusal surfaces of molars, there is superimposition of these bands, which, in ground sections, have therefore been described as "tufts." The resistance of the inter-rod or cement substance to the lytic activity of bacteria was also demonstrated. In caries, the center of the rod is destroyed first and the process continues in a conical fashion. By use of the grenz x-ray, Applebaum *et al.*[8] have shown variation in roentgenographic density of the bands of Schreger.

Fig. 2.—Decalcified section of normal enamel. The spots seen in the photomicrograph cannot always be avoided since the specimen must not be washed excessively if the organic matrix is to be retained. A, enamel matrix of occlusal surface. B, alternate bands. C, gnarled enamel. D, dentin. N, Nasmyth's membrane. (16 mm. obj.; ×10.)

The present study is devoted to histologic variations in the organic matrix of the enamel and its physiologic and pathologic significance. The material presented and discussed cannot be thoroughly understood without the data included in the first paper on this subject.[4] The structural detail of the enamel was described comprehensively therein.

In order to fully appreciate the rôle of the organic matrix, it is advisable to follow it through its life cycle.

In the formative stage, the matrix is a dense substance that is easily retained in decalcification even when no precautions are taken. The distribution of the structural elements is similar to that seen in ground sections. The matrix stains deeply and is so well knit that it is rarely frayed in the preparation of the specimen. With the inception of calcification, there is a distinct difference in staining qualities of the uncalcified and calcified matrix. The organic structure is increasingly more difficult to retain as calcification progresses. Disturbances of calcium-phosphorus metabolism during the formative period affect the organic as well as the inorganic content of the enamel.

In Figure 1 is seen a decalcified section of a forming tooth. The enamel matrix stains deeply and is not distorted. Peripherally are the ameloblasts, the stellate reticulum and the outer epithelium. Beneath the enamel is the dentin, which holds the dental papilla, the future pulp.

Normal enamel, as seen in erupted teeth, presents two zones. The inner zone is arranged in alternate bands, which do not appear in extreme regularity, but vary in width and length. The outer portion of the enamel stains lightly and most of the content of the rods is usually lost. Well-calcified enamel is the most difficult to retain.

Figure 2 presents a section of the occlusal enamel of a normal molar. The dentinal segment shows the alternate

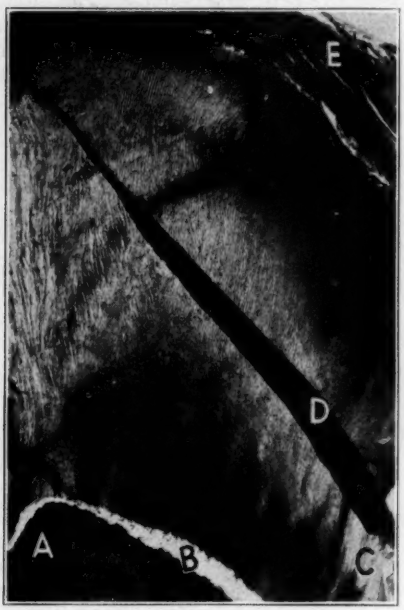

Fig. 3.—Decalcified section of impacted tooth, showing enamel matrix. The latter must be handled very carefully. Any attempt to correct the fold in the specimen would tear the matrix. A, dentin. B, enamel spindles. C, alternate bands. D, fold in specimen. E, Nasmyth's membrane and attached fibrous tissue. (16 mm. obj.; ×10.)

Fig. 4.—Decalcified section of organic matrix of enamel adjoining amalgam filling. A, Nasmyth's membrane. B, stria of Retzius. C, alternate bands. (16 mm. obj.; ×10.)

bands. The matrix of the peripheral zone is hardly discernible in the photomicrograph. Since the area stains so faintly, the fine detail of gnarled enamel is studied best in a fairly dark field.

The enamel of poorly calcified teeth is easily retained if a proper technic is used. It takes an even stain of varying intensity. It seems that the alternate bands, although present, do not stand out so clearly as in the normal erupted teeth. There is less organic matrix in the rods than was present in the formative stage, but much more than is seen in normal tissue. In some instances, almost the entire crown is retained. This is observed in many supernumerary teeth and many teeth that are

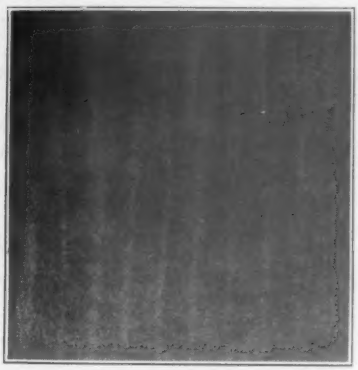

Fig. 5.—Decalcified section of organic matrix of undermined enamel, showing increased density of rods. The cement substance is almost colorless. The cross-sections are to be noted. (1.4 mm. obj.; ×20.)

completely impacted, unerupted or exfoliated before the roots are fully formed.

In Figure 3 is seen the organic matrix of an impacted tooth. The formation of the tissue is clearly outlined. The alternate bands do not stain so well as in normal enamel, but are discernible. The mass does not exhibit any localized concentration of stain; an evidence of evenness of texture.

In clinical work, we have observed the darkening of the enamel margins, especially around amalgam fillings. This has been attributed to the diffusion of metallic particles. In several such teeth, the matrix of the adjoining enamel was studied. The entire mass took a deep hematoxylin stain. The histologic picture seems to point to a distinct change in the organic matrix. The pulps of these teeth were normal. As much of the matrix as is seen in poorly calcified teeth is retained. The structures are well stained. The organic matrix is decidedly different from those forms described above.

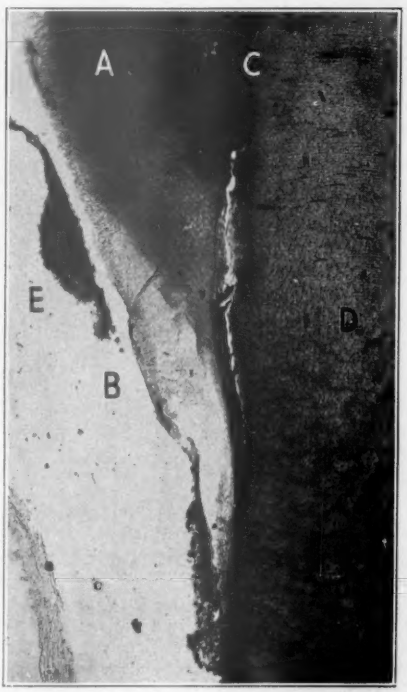

Fig. 6.—Decalcified section of undermining caries of proximal surface of molar. A, undermined enamel. B, normal enamel. C, caries. D, dentin. E, tartar. (16 mm. obj.; ×10.)

The enamel adjoining an amalgam filling is seen in Figure 4. The alternate bands are comparatively small in this section. In other areas, they are so well stained that they are in sharp contrast to the rest of the enamel, even though the

latter is well outlined. A stria of Retzius is clearly seen. These striae have been described in an earlier paper. Whereas the alternate bands show areas of greater organic content along the rods, in the striae there is a narrow zone that traverses the width of the specimen and represents stages of altered calcification in the formation of the tooth. There may be a similarity to the interglobular spaces of the dentin.

The organic matrix of enamel that is undermined by caries takes a deep eosin stain. There are several stages through which such enamel passes. At first, there is an increased amount of organic matter

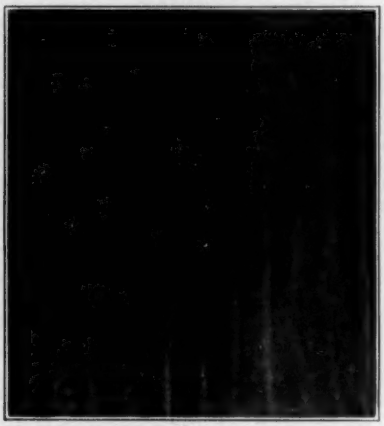

Fig. 7.—Decalcified section of organic matrix with brownish discoloration; showing density of rods, cross-striations and bamboo stick appearance. These areas are not stained by histologic technic, but retain the coloring of the clinical lesion. (1.4 mm. obj.; ×20.)

seen in the rods. The cross-striations may become very distinct. The stained rods are in contrast to the cement substance, which is almost colorless. As caries progresses, the mass stains more deeply and the structures become less distinct. The histologic changes are best appreciated by studying the photomicrographs.

In Figure 5 are seen rods that show an increase in density due to undermining caries. No bacteria are present in the rods that are visible. Where such rods are attacked, there is lysis proceeding from the center toward the periphery. The cement substance is most resistant to bacterial destruction.

In Figure 6 is shown advanced undermining of the enamel. The matrix is deeply stained. The demarcation in the cervical region between normal and undermined enamel is evident.

Brownish discoloration of the enamel is observed most frequently on approximal surfaces and in occlusal fissures. Although roentgenographically these areas seem to be destroyed, they retain the contour of the enamel and an appreciable hardness. The matrix is retained perfectly. The cross-striations are always distinct. The entire organic content of the rod is preserved. This consolidation and pigmentation of the matrix probably indicates some form of keratinization in the attempt to arrest the carious process. No bacteria are visible in these rods. There is a similarity between brownish discoloration of the enamel and arrested caries of the dentin.

Figure 7 shows the distinctive appearance of such discoloration. The density and cross-striations of the rods are to be noted. These areas are not stained by histologic methods: the brownish tone is the actual color of the lesion. In the mouth, some of these zones are so intense that they appear black.

In the average specimen of human caries, comparatively few rods disintegrate in the process of penetrating the enamel. The cavity seen clinically, even in very early stages, is produced by undermining decay at the dentino-enamel junction. This is best observed in interproximal caries of the anterior teeth, where extensive darkening of the enamel is observed even though a fine explorer can hardly catch on the surface. In studies being conducted, the only bacteria found in the substance of rods undergoing lysis are coccoid forms. Histologically, the cement or inter-rod substance looks and acts like

Neuman's sheath of the dentin. Neuman's sheath is the lighter staining area circumscribing the dentinal tubules. They both are more resistant to the lytic action of bacteria and strong acids.

The similarity in nature of the organic matrices of enamel, dentin and bone is observed in the resorption of impacted and unerupted teeth. Not only are there Howship's lacunae, which are characteristic of osseous resorption, but there is frequently also an osteoid deposit conseen in another section of the same specimen. The similarity in the histologic behavior of the enamel and dentin is evident. The lesion is morphologically identical with the resorption of bone.

Figure 9 is a section of an impacted supernumerary tooth. The quantity of matrix retained is to be noted. Osteoid substance is deposited against the enamel crown. The enamel matrix is pulled away in many areas. Owing to the difference in optical density, it is difficult to show

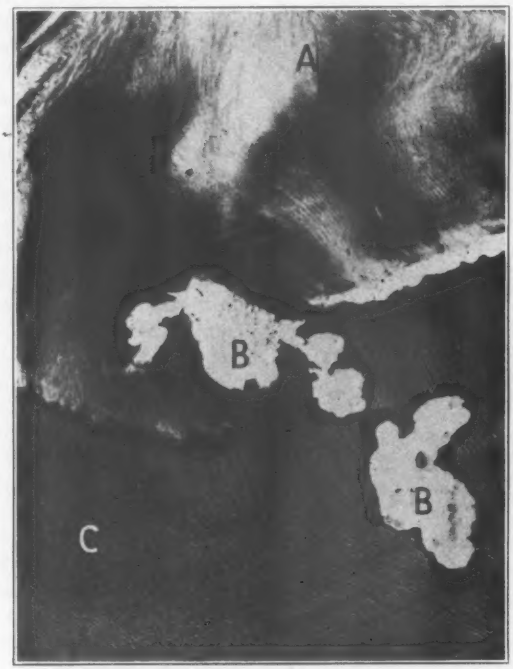

Fig. 8.—Resorption of organic matrix of enamel and dentin in decalcified specimen of impacted tooth. This area is shown because of the characteristic lacunae. All resorption starts at the surface. A, enamel. B, Howship's lacunae. C, dentin. (16 mm. obj.; × 10.)

tiguous to and continuous with the enamel matrix. The type of fibrillar structure that constitutes the organic matrices of all calcified tissues is undoubtedly basically similar.

Figure 8 shows resorption of the enamel and dentin of an impacted third molar. It always occurs from without. This is detail, but high power studies disclose apposition of the matrices. This process is identical with resorption in dentin, where such areas are filled with cementum and osteoid.

The importance of mineral metabolism in the formation of osseous tissues is now common knowledge. Its rôle in the calci-

fication of enamel and dentin has been established by experimental work extending over twenty-five years. Whether nutritional and pathologic disturbances can affect the calcified tooth has not been determined to the satisfaction of the great majority of workers. Although the literature is voluminous, results are far from consistent. This is no discredit to the type of experimental work done: it attests the complexity of the problem. An author

Fig. 9.—Decalcified section of impacted supernumerary tooth; showing juxtaposition of enamel and bone matrices. A, dentin. B, enamel. C, bone. D, space created by tearing of enamel matrix from bony shell surrounding it. (×14.)

cannot but be influenced by his previous studies on this subject.[9, 10, 11, 12, 13] The true behavior of the enamel will not be established until its histology and pathology are understood.

It has been shown that enamel is truly a calcified tissue having an organic matrix impregnated with calcific salts. The exact dimension of every structure is determined in this extremely delicate organic framework.

The enamel matrix may be either a formative mechanism that is of no consequence in the behavior of the mature tissue or it may have an active rôle in its health and disease. If there is no such thing as a "vital" reaction in the enamel, once the tissue is formed, no local changes should alter its microscopic appearance, other than from the solution of definitely localized areas in carious destruction. However, if there is alteration in the appearance of enamel beyond the surface subjected to the local environment, such change may have evolved from "internal" processes.

A comparison of forming, poorly calcified and normal enamel of erupted teeth shows that there is a change in the organic framework on calcification. The specimens of brownish discoloration, darkening due to filling and undermined enamel exhibit structural changes in completely formed and mature tissue. That the brownish discoloration is caused by purely local bacteria activity is impossible in that no bacteria can be found in these lesions. Carious rods may be present, but there is no lysis of the brownish ones. These lesions may exist for years without the formation of a cavity. In fact, the longer that they remain so, the less likely are they to undergo bacterial lysis. These areas are radiolucent; which indicates that there originally was localized decalcification by a bacterial process. The most destructive lesion of the enamel that we encounter is the type in which the enamel is not discolored as described. Patients suffering from rampant caries show a chalky and gray decay that progresses with great rapidity.

In the several specimens in which the enamel was discolored owing to the presence of fillings, the organic matrix was denser and more deeply stained than nor-

mal enamel. Such change is the response of a vital substance to a pathologic irritation. The diffusion of metallic particles and chemical and thermal changes may be causative agents, but the dark color of such enamel is due to alteration of the organic matrix.

Enamel being undermined takes a deeper eosin stain, showing a much greater density of the matrix. There is a distinct demarcation between normal and undermined enamel. With the extension of caries, fracture occurs and large pieces of enamel can be found loose in the cavity. Several phases of the process are seen. At first, there is a consolidation of the matrix. The lips of the cavity frequently show a brownish discoloration of the rods. This is an attempt to resist the progress of the disease. Caries of the dentin is quite advanced before the enamel seems to be attacked from within. As the enamel is destroyed, there is a deepening of the staining quality and disintegration of its matrix until the outline of the structures is indistinct.

CONCLUSIONS

1. There is an organic matrix in all types of enamel, forming or mature, about which calcific salts are deposited.

2. The quantity of the matrix varies in different specimens.

3. Mature normal enamel matrix can undergo change, indicated by (a) darkening of the adjoining fillings; (b) brownish discoloration, or (c) undermining of the enamel by caries.

4. The organic matrix of the enamel is similar to that of dentin and bone.

5. The extensiveness of the organic matrix of the enamel, the disposition of its histologic structures and the ability to undergo change indicate an active, though minute, interchange with the underlying dentin.

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FUNDAMENTAL PRINCIPLES IN THE MANAGEMENT OF ORAL DISEASE

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DENTISTRY, celebrating its one hundredth anniversary in 1940, will look back over a century of progress that constitutes an enviable record. The dental profession in all lands will commemorate the founding of a great science. History has seen an advance from the wood-lot amphitheater, with the stump of a tree serving as a table or chair, and the surgeon, a farmer or blacksmith, trying the might of his brawny arms and hands with a pair of iron tongs upon an aching tooth, and "yanking" the offender. After the operation, the terrified patient would pick himself up off the ground, holding the remaining portion of his jaws in both hands, too frightened to acknowledge pain and too demoralized to seek help in the event of complications—if, indeed, help were to be had. If we are to believe our grandfathers, the chest of the patient frequently served as a resting place for the knee of the operator, and thus a greater force and a heftier "yank" were possible.

Those were the days of the pioneers. We hear nothing of complications, and presumably there were none. But records were not kept and tragedies were so common that they were soon forgotten.

The only purpose such memories serve is to note with satisfaction the vastly different, more humane and efficient service that the modern dentist renders his patient today. The scope of dentistry has broadened from the days of the "tooth yanker" to a scientific knowledge that is applied in evaluation of diseases of the mouth and replacement with artificial substitutes of structures lost in the repair of oral conditions.

Present-day management of the abnormal or pathologic conditions that are frequently encountered in the general practice of dentistry involves a fundamental knowledge of oral surgery. The differentiation between so-called minor and major oral surgery is difficult, for the extraction of a tooth, which is considered a minor procedure, frequently becomes a major one in every sense, through complications that may arise.

The general practitioner of dentistry should be able to recognize the various pathologic conditions that may occur within the mouth. He should, however, undertake the care of only such cases as he feels thoroughly competent to carry through to completion, regardless of possible extension to other parts.

Any operation, whether it be in the field of medicine or that of dentistry, should be designed to benefit the patient and should be performed only in the presence of conditions that require correction. Because surgery of the mouth frequently involves the loss of teeth, with consequent impaired function, careful consideration must be given to the physical, mechanical and esthetic results. A patient who requires surgical care is entitled to and should receive the following considerations: (1) accurate diagnosis; (2) use of the proper anesthetic; (3)

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correct operative procedure, and (4) postoperative care.

DIAGNOSIS

It must be remembered that correct diagnosis is the basis of all successful treatment, and diagnosis must be complete before the anesthetic can be selected or the operative procedure can be undertaken. Diagnosis embodies a consideration of roentgenographic findings and their correlation with the history and the clinical signs and symptoms, as effected by other tests, such as inspection, palpation, percussion, thermal change and electric vitality tests, bacteriologic examination and other aids now available to the dentist. Many times, cooperation with the patient's physician is essential in order that his findings and interpretation of general conditions, based upon laboratory reports and physical examination, may be added to those of the dentist.

Through scientific research and discovery, it has been definitely established that diseases of the teeth and of their supporting tissues play an important part in health problems. Serious disease conditions of the jaw frequently do not receive immediate attention, whereas a similar condition in another part of the body would immediately suggest the hospital, a positive diagnosis and appropriate treatment. Close cooperation between medicine and dentistry is imperative if the patient is to receive the maximum benefit from modern health service. With recognition of the importance of a complete and thorough mouth examination in every case, there is bound to be an ever closer cooperation between the two professions.

It is generally agreed that the roentgen rays, if properly used, are one of the greatest aids in oral diagnosis. However, one should not depend solely on roentgenograms in making a diagnosis. Too frequently, written interpretations based upon roentgenographic findings alone, as submitted by the x-ray laboratory, are accepted as a diagnosis by the physician or dentist. There is an important distinction between the dentist who furnishes a consulting service, aided by roentgenograms, and the laboratory which operates a technical service for the production of films.

The general appearance of the oral mucosa is frequently a characteristic sign of constitutional disease as reflected in the oral cavity, and so is of importance to the dentist in making a thorough diagnosis of mouth conditions. There is probably no area in the human body that affords more information concerning the state of health than the soft tissues surrounding the teeth. Such diseases as diabetes mellitus, leukemia, agranulocytic angina, anemia and the thrombopenic type of purpura hemorrhagica frequently cause characteristic changes in the oral mucosa, and the recognition of such changes by the dentist may aid materially in the early diagnosis of such diseases.

The dental profession must realize its obligation and responsibility in this important field. Hospitals should be encouraged in the establishment of a dental service as a part of their organization, and dentists should be urged to seek appointments to hospital staffs. Dental schools should include, as part of the curriculum during the senior year, hospital routine and organization, as well as bedside dental service. By such correlation of interests, the problems of both professions will be brought into closer relationship, and a fuller appreciation of the value of dental service and of dentistry as a profession will result.

SELECTION OF ANESTHESIA

In any surgical procedure within the mouth, the selection of the anesthetic is extremely important. The decision as to the anesthetic to be used should be based upon the training and experience of the operator, the physical condition of the

patient and the type of operation to be performed. No one anesthetic is best suited to all cases, but there is generally one that is best suited to the patient and to the operation. The successful operator selects the anesthetic best adapted to the case, the one from which the patient will receive maximum benefit.

Of the various general anesthetics in use at the present time, nitrous oxide and oxygen is the one most extensively used, and probably the one best suited to surgical procedures involving the teeth and adjacent structures. For the proper use of this valuable anesthetic, thorough training and experience in its administration are required. Such training should not consist of information gained from a salesman of apparatus for administering nitrous oxide and oxygen, but should be based upon knowledge of the action of these two gases, the various signs and symptoms of anesthesia and the technic of administration. One must be capable of recognizing and handling all phases of anesthesia, without relying entirely upon a mechanical device.

If regional or block anesthesia is the method of choice, it must be remembered that its successful administration calls for scrupulous asepsis, the proper anesthetic solution, a thorough knowledge of the anatomy of the parts involved and an exact technic.

OPERATIVE PROCEDURES

Frequently, oral operations are undertaken without careful consideration of the essential factors. To most patients, when a tooth is involved, it is a simple matter of having the tooth "pulled," and often the dentist is hesitant to advise x-ray and other careful examination before undertaking what the patient believes to be a simple procedure. This often leads to difficulties for the patient and for the operator as well. Correct operative procedure in the removal of teeth and the restoration of the mouth to function has a definite bearing on the health, both present and future, of the patient.

It is impossible to lay down iron-clad rules to be followed in every case, but the importance of a predetermined plan as a basis of operation should be emphasized. To discuss in detail various operative procedures would be impossible, but an attempt will be made to present practical points of interest to the general practitioner.

EXTRACTION OF TEETH

The removal of any tooth is a surgical procedure, requiring application of the same surgical principles as are followed elsewhere in the body. It is the operator's obligation to remove all teeth with only the trauma necessary, to eradicate pathologic areas and to remember that he is preparing the foundation upon which the patient will necessarily wear a prosthesis. It is imperative that the operator follow a definite technic, in order that the patient may receive maximum benefit and be assured the same result as might be expected of surgical measures in any other part of the body.

Each tooth to be removed should be examined as to location; position in the arch; size, shape and condition of the crown, and whether it is decayed or fractured, and whether a gold crown or porcelain crown with pivot is present. Careful examination of the roentgenograms as to the density and condition otherwise of surrounding osseous structures, curvature and shape of the root, the condition of the adjoining teeth and the possible presence of pathologic areas must also be considered. If there are teeth with periapical bone destruction, excementosed or curved roots or excessively heavy alveolar crests; teeth broken down beneath the alveolar margin, or impacted or malposed teeth, an entirely different procedure is required from that which may be classified as a simple extraction.

ACUTE INFECTION

Treatment of the acute type of dental infection should consist of controlling the inflammatory process wherever possible and the establishment of proper drainage whenever necessary. In an acute alveolar abscess, drainage may be established through the tooth socket by removal of the tooth, if the infection has not extended to involve the periosteum and surrounding tissues. In such cases, more adequate drainage is necessary, and this should be maintained for a sufficient time to enable the resisting forces to combat the infection and restore the tissues to a more healthy condition. In many cases, extraction of the tooth is contraindicated until the acute infection has subsided, as it may cause a dissemination of infection.

The question is frequently asked: "Should an acutely infected tooth be extracted?" Such a question is almost as illogical as: "What causes a fever?" With an acutely infected tooth, the procedure to be followed should be based upon the condition present, as revealed by roentgenograms, history and clinical examination. The resistance of the patient, the determination of which is difficult, the extent of infection, the type of organisms present and the general health of the patient are some of the factors to be considered.

Two cases will serve to illustrate more definitely some of the principles involved and to indicate what can be done.

In the first case, the patient appears to be in good health, but has a tooth that is sore, with some swelling and inflammation of the adjoining tissues. Usually, the condition has persisted for several days, with no great increase in swelling or elevation of temperature. Roentgenographic examination may reveal apical bone change that appears as an acute and not a chronic area. The tooth is found to be sore on percussion. The pulp may be vital, non-vital or only partially vital, or it may be pulpless. Such a tooth can be extracted with comparative safety, as long as a local anesthetic solution is not infiltrated into or through the tissues surrounding the tooth.

In this type of case, it would be practical to assume that a sufficient number of phagocytic cells and antibodies have developed in the blood to cope with the infection. Furthermore, the time is sufficient to have permitted a defensive action of the leukocytes, fibroblasts and giant cells around the infected area. The tooth should be removed with a minimum of trauma to prevent the destruction of the protective mechanism which has developed. The removal of the tooth, even though the involvement is acute, will usually establish sufficient drainage through the socket and can be considered a safe and indicated procedure.

In the other type of case, the patient has an extremely sore, aching tooth and the surrounding tissues and the side of the face are swollen and definitely involved. The patient appears ill and the temperature may be elevated to 100 to 103° F. The tissues surrounding the tooth are inflamed and angry appearing. Usually, the tooth is extremely sore on percussion and the pulp is non-vital. Roentgenograms may or may not reveal an area of bone destruction. The general physical condition of such a patient is usually below par, the acute flare-up having developed rather rapidly, and undoubtedly the resistant forces could not possibly combat such an additional load as would be placed upon it if the tooth were extracted.

In such a case, localization of the infection through the application of hot moist dressings, rest and proper supportive and sedative measures are indicated. As soon as the infection has localized, the area should be incised, either externally or internally, according to the area of involvement, and drainage should be instituted and maintained for a sufficient time. When the acute condition has subsided and the patient has regained

some of his general resistance, the tooth can be extracted with comparative safety.

A few general observations can be made which might be considered the rule, but many variations do exist, and frequent exceptions are to be found.

1. In most cases, a defensive leukocytic reaction occurs with fair rapidity.

2. Different strains of bacteria are involved, as a rule benign, but in some instances almost malignant.

3. When an infection has invaded the bone and periosteal tissues, the extraction of the tooth offers entirely inadequate drainage.

4. The elements in a blood clot offer a favorable culture medium for the growth of existing bacteria, and therefore actually tend to increase the amount of infection.

5. The leukocytic wall is a defense mechanism to be protected, if extension into the deeper tissue planes is to be avoided.

6. Local infiltration of an anesthetic solution may be the route of extension of infection into the deeper tissues.

In answering the question, "Should a tooth be extracted while it is involved in the acute stage of an alveolar abscess?" the answer obviously resolves itself into considering all factors involved and then following the dictates of what is termed good surgical judgment. Usually, the more conservative the interference in such cases, the fewer the complications for both patient and operator.

It is imperative that good judgment be used in any case that requires surgical interference. Such judgment is not based on merely a superficial examination, but is a comparative evaluation of a positive oral diagnosis and the experience of the dentist in the management of such cases. Experience, plus a thorough examination, are important factors in the development of what is termed good surgical judgment.

One of the most common of the superficial infections is acute Vincent's infection. The danger of surgical interference in these cases is great and should be avoided until the condition has been brought under control.

Infection around unerupted or impacted third molars should be carefully treated before operation is attempted, as the danger of spreading infection in this region is great. It is not always necessary to clear up the condition completely before removal of the tooth, but, after a few treatments, the tissues will be better able to protect themselves against the invasion of bacteria, which may result from the trauma produced by operation.

MALIGNANT TUMORS

A presentation dealing with the management of abnormal or pathologic conditions of the mouth would not be complete without emphasis on the importance of early recognition, diagnosis and treatment of malignant or potentially malignant tumors found in this region. Such tumors may rarely be encountered, but when we consider that 4 per cent of the malignant tumors of the body have their origin in the mouth, the importance of the recognition of such lesions by the general dentist will be readily appreciated.

The only method of accurate diagnosis of malignancy is microscopic examination or biopsy, which should be made in the treatment of all suspicious lesions. A piece of tissue about the size of a pea is sufficient for such an examination. A detailed discussion of cysts, osteomyelitis, difficult extractions and other conditions which come under the observation of the dentist is impossible here.

POSTOPERATIVE CARE

Postoperative roentgenographic examination following removal of all the teeth is always a wise procedure. It assures the patient of the successful accomplishment of the undertaking, and re-

lieves him of fear of the possibility of future trouble. In single extractions, postoperative films should be made if a tooth has been fractured. Many times, the operator is confident that he has removed the tooth in its entirety, but a roentgenographic checkup will reveal residual root particles.

Postoperative care should never be neglected. No matter how skilfully the operation has been performed, home care, return visits for irrigation and treatment and careful observation are imperative to prevent complications and to keep the patient comfortable.

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DIFFERENTIAL DIAGNOSIS OF ACUTE INFLAMMATORY SWELLINGS OF THE FACE AND NECK

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THE differential diagnosis of acute swellings about the face and neck provides the common meeting ground for the oral surgeon, the general surgeon and the otolaryngologist. Diagnostic acumen and surgical skill may be taxed to the utmost in the management of cases of acute suppuration in these regions of vital importance.

Since a complete discussion of this subject is clearly beyond the scope of this paper, an attempt will be made to outline the general principles of differential diagnosis in some of the more common acute inflammatory processes of the face and neck, which will be considered in turn according to etiology, anatomic location and potentialities for involving neighboring or distant structures.

The first diagnostic step is a knowledge of the possible anatomic locations of the various inflammatory processes in these regions. In general, they may be primary in the skin and subcutaneous tissue or in the underlying bone, cartilage, lymph glands, salivary glands and fascial spaces, with or without secondary involvement of the integument. Another diagnostic aid is knowledge of the regional anatomy, which permits anticipation of the direction of spread of infection by continuity and contiguity of tissue and by lymphogenous or hematogenous routes. This anatomic approach to the subject allows one to evaluate more accurately the clinical findings. By his acquaintance with the fascial planes and other dense tissues underlying the superficial swelling, the examiner may avoid costly procrastination in acute suppurative processes which may never present themselves as superficial fluctuant abscesses.

I. ACUTE INFECTIONS OF THE PARANASAL SINUSES

Diagnostic of acute paranasal sinus suppuration is nasal obstruction of varying degrees, and purulent nasal and postnasal discharge. Except in those rather infrequent cases of dental origin in which the etiology is usually clear, the presence of an acute upper respiratory infection is obvious. There is tenderness over the sinuses only in the presence of severe acute swelling of the lining mucous membrane or in the event of pressure reten-

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tion of pus. Pain, increased in the head-low position, is regional; that is, the pain is referred to the region of the involved sinus and is not in the form of a generalized headache.

An uncomplicated sinusitis is not accompanied by an external swelling. When external swelling does occur, it is a danger sign, signifying an extension of the infection beyond the bounds of the intra-sinusal mucous membrane. This complicating finding may be accompanied by one or more of the other important danger signs of acute suppurative sinusitis, which are high fever, leukocyte count of 15,000 or more, generalized headache, prostration and changes in the sensorium, none of which are elicited in uncomplicated cases. It may indicate periostitis when there is a localized, and usually small red firm, non-fluctuant tender swelling located more commonly at the inner canthus or perhaps in the upper lid. Although there may be puffy edema of the upper eyelid, there is no proptosis, no limitation of extra-ocular movements and rarely any edema of the ocular conjunctiva. This condition signifies an extension of infection through the intra-sinusal mucosa to the periosteum which may be the precursor of osteomyelitis. The location of such swelling is explained by the fact that the bony plate of the frontal sinus is thinnest in its floor and therefore more vulnerable to penetrating infection.

The relative thickness of the external walls of the antrum precludes the possibility of extension of the suppuration into the cheek except in those fulminating infections resulting in a spreading osteomyelitis of the small bones of the face. The appearance of fluctuation indicates a direct extension through the bone and calls for simple soft-tissue drainage. This does not necessarily indicate a spreading type of osteomyelitis of the frontal bone. A true osteomyelitis of the skull is characterized by increasing prostration with spreading of the external fluctuant swelling surrounded by an area of pitting, puffy edema.

The diagnosis of the latter condition is facilitated by roentgenographic studies of the skull, which, although they may show no abnormality in the early stages, will demonstrate within a few days an area of irregular radiolucency in the frontal bone adjacent to the frontal sinus. Such an osteomyelitic process may present itself as one of two distinct types: first, that of the cranial vault, starting as a rule in the frontal sinus and having a relatively good prognosis under expert management by those trained in its care; and, second, osteomyelitis of the small bones of the face having origin in a fulminating infection of the ethmoid or maxillary sinuses and running a devastating and usually fatal course despite heroic therapeutic measures.

Proptosis, or external protrusion, of the eyeball occasionally appears during a complication of paranasal sinus suppuration and demands consideration at this point, particularly with reference to its unilateral occurrence. When peri-orbital abscess is the cause of the proptosis, the source may be the frontal sinus, ruptured through its floor, or the cells of the ethmoidal labyrinth that have allowed suppuration to extend through their thin lateral walls, which comprise the *os planum* of the ethmoid bone or the mesial wall of the orbit. In the first instance, the proptosis will be downward; in the second, it will manifest itself as a lateral displacement of the eyeball. Marked swelling of the lids with some conjunctival edema will be apparent. The extra-ocular muscles will continue to function, but may demonstrate some imbalance due to displacement of the globe.

Should the peri-orbital infection extend to the intra-orbital fat and muscle cone, there will appear a marked increase in the local and general symptoms as a true orbital cellulitis or orbital abscess develops. Prostration and fever increase. The forward protrusion becomes greater

and is associated with limitation of eye movements, leading to fixation of the globe as the orbital muscle cone becomes involved in the inflammatory process. The conjunctiva becomes red and swells until, occasionally, it becomes chemotic, appearing as a pale fleshy mass projecting between the lids, which are separated with difficulty. To differentiate this picture from that of cavernous sinus thrombosis is oftentimes exceedingly difficult. In the latter, the proptosis, unilateral in the beginning, is associated with profound sepsis, as indicated by chills, fever and a positive blood culture. The eyeball protrudes straight forward and there is paralysis of one or more of the extra-ocular muscles, due to inflammation and pressure upon the nerves passing through the thrombosed cavernous sinus.

In a large percentage of cases, the thrombosis extends to the adjacent sinus and causes similar changes in the contralateral eye if the progress of the infection is not checked. As the septic thrombosis extends through the venous sinus system of the skull, the pathognomonic mastoid edema develops, as a result of occlusion of the mastoid emissary vein. Signs of meningitis soon predominate in the picture, followed by the fatal termination.

II. INFLAMMATORY PROCESSES IN THE SALIVARY GLANDS

One of the common causes of swelling of the parotid glands is epidemic interstitial parotitis, or mumps. Although the parotid glands are usually involved alone, the submaxillary glands may participate in this disease, which is an acute contagious infection noted more commonly in children between the years of 6 and 15, but which may attack persons of any age. The exact etiologic agent is unknown, but it is thought that a filterable virus is the causative factor. The cardinal sign is a diffusely swollen, tense, slightly tender gland, which gives rise to increased discomfort when stimulants are applied to the salivary glands. Diagnosis depends on an anamnesis suggesting exposure and the presence of the swollen gland as described, low-grade fever and malaise and the characteristic red edematous mouth of Stenson's duct, through which normal appearing saliva is seen to flow. The presence of thin clear saliva indicates the interstitial nature of the infection, since the consistency of the saliva is invariably altered if the secretory epithelium of the acini is the seat of an inflammatory change.

The parotid gland may become chronically swollen and enlarged in the event of obstruction of Stenson's duct or one of its main tributaries. In such instances, the external swelling may appear diffusely over the entire gland and it has a tendency to increase in size at mealtime, since most of these cases have incomplete obstruction of the duct system. The general malaise and lymphocytosis of epidemic parotitis are absent, as is the diagnostic red swelling of the mouth of the duct in the cheek opposite the upper second molar tooth. Discomfort is usually limited to a feeling of tension on the side of the face involved. The formation of calculi in Stenson's duct or one of its tributaries is usually responsible for such obstruction. Since these calculi are occasionally radiolucent, the roentgenogram cannot be invoked for final diagnosis unless it is positive. Probing of the duct is a helpful diagnostic procedure, for, in most instances, the stones can be thus palpated. Occasionally, a cicatricial stenosis resulting from injury or infection may produce symptoms and signs simulating those of obstructing calculi, in which case probing and roentgenographic visualization, after injection of a radiopaque substance such as lipiodol into the parotid duct, are of diagnostic assistance.

Acinar inflammation, in contradistinction to the interstitial changes of mumps, involves the secretory epithelium and is characterized by parotid swelling and

altered saliva. The non-suppurative type commonly follows prolonged obstruction, with associated low-grade secondary infection. Again, the parotid gland becomes swollen, but the swelling is persistent, although there is some tendency for the intumescence to increase during mealtime. In these cases, milking of the duct produces a thick glairy mucus rather than the usual thin watery saliva that can be expressed from the duct of the normal gland.

Acute suppurative processes within the parotid gland are likewise acinar inflammatory changes in the beginning. It is now the consensus of opinion that mouth organisms entering the duct in debilitated and dehydrated persons are causative agents, although, in some instances, there is evidence that the infection is hematogenous. These infections most frequently follow abdominal operations upon seriously ill, undernourished and dehydrated patients with poor oral hygiene. Some surgeons state, however, that they have never seen a parotid abscess develop in a well-hydrated person.

Another factor which should be borne in mind is trauma to the gland during anesthesia. Inflammatory changes, occasionally resulting in abscess formation, have been noted after prolonged and difficult general anesthesia during which the anesthetist found it necessary to keep a firm lifting grasp on the angle of the mandible. An exquisitely tender, tense and swollen gland associated with fever and leukocytosis marks the onset.

A diagnostic aid of great value is the milking of the parotid duct by pressure over the outside of the cheek, which produces a purulent or mucopurulent exudate rather than normal saliva, although this need not be the case in the occasional blood-borne infection in which the abscess might not be connected with one of the tributaries of the duct.

As the disease progresses, which it will in most debilitated patients because of the ineffectual drainage through the duct system, the gland becomes greatly swollen, and forms a large external mass displacing the lobe of the ear forward and outward and extending well over the angle of the mandible and onto the cheek. Although small areas of fluctuation corresponding to lobulations of the gland appear late, one does not wait for fluctuation before instituting radical surgical drainage. Occasionally, a parotid abscess will rupture into the external auditory canal, where there will be noted a purulent exudate, suggesting the possibility of a suppurative otitis media. Although pus may surround the facial nerve as it courses between the superficial and deep portions of the gland, rarely, if ever, is facial paralysis associated with the disease.

The submaxillary gland falls heir to the same diseases as the parotid, and differential diagnosis demands the same precision in history taking, palpation, observation of the type of secretion and interpretation of roentgenograms. An occasional obstacle to differential diagnosis presents itself as a confusing submaxillary lymphadenitis.

III. SOFT TISSUE INFECTIONS OF THE FACE

When external facial swelling results from an inflammatory process in the soft tissues, the efficient management of the case depends less on the differential diagnosis of the primary lesion than on an understanding of the potentialities for spread of the infection. The bright red waxy tender well-demarcated superficial swelling of erysipelas is usually easy of recognition. The onset is sudden and is ushered in with high fever and prostration. Although a surgical or traumatic wound often serves as a point of origin, the disease may appear without an obvious break in the integument. Deeper in the subcutaneous tissue, the phlegmonous processes in the face usually have their inception in infections of hair follicles or sebaceous glands. When trauma is lacking, such infections tend to be well localized and the infected tissues either

become absorbed or small surface pustules appear.

The common practice of squeezing pimples on the face accounts for a high percentage of the serious facial suppurations. The traumatic breaking down of the natural peripheral barriers allows regional spread by continuity of tissue and dissemination to distant parts through the lymphatic and venous channels. Since the muscles of expression are surrounded by nothing other than subcutaneous tissue, there are no fascial planes in the superficial structures of the face to prevent the spread of an infection throughout the soft tissue. The direct collateral venous drainage from the upper lip, nose, eyes and forehead to the cavernous sinus accounts for the appearance of thrombosis of this venous sinus in cases of cellulitis above the angles of the mouth. The less dangerous lower lip and chin infections have their drainage toward the submaxillary and submental lymph nodes. Although these suppurative processes may be very severe and may produce a vicious type of phlegmon, they are not prone to result in the dreaded septic thrombosis of the cavernous sinus.

Occasionally, infections in the alveolus or gingival tissue following dental extraction extend into the buccal fat pad to produce a suppurative cellulitis of the cheek. Diagnosis of this local lesion rarely offers any difficulty, but an associated masticator space suppuration, to be considered later, must be borne in mind.

IV. ACUTE LYMPH GLANDULAR SWELLING

Acute enlargement of the lymphatic glands is most commonly noted in the anterior and posterior cervical chains or in the submaxillary and submental triangles. In the great majority of these cases, the acute swelling is produced by acute suppurative processes in line with their afferent channels. In such cases, the glands are at first firm, discrete, freely movable and intensely tender. Examination will reveal the primary focus in the mouth or pharynx. Although the glands may become very large, the discreteness and absence of surrounding cellulitis testify against necrosis and pus formation. When the gland does suppurate, it may be difficult to feel fluctuation, owing to the presence of the overlying fascia and muscularis. In the diagnosis of lymphatic gland abscess, one must take cognizance of the fact that time in days is usually necessary to effect necrosis and suppuration. Fever, leukocytosis, tenderness and periglandular induration, as evidenced by the inability of the examining fingers to grasp and identify single discrete glands which have been swollen for from three to six days, are frequently sufficient to establish the diagnosis of abscess formation. Rarely is pus to be found in a gland which can be felt as a relatively soft discrete movable mass. Prompt recognition and drainage of lymph glandular abscesses are of great importance, because of the possible spread of infection to surrounding vital structures.

Other causes of acute lymph glandular swellings which must be considered in making the differential diagnosis are: (1) acute infectious mononucleosis; (2) acute tuberculous lymphadenitis; (3) lymphosarcoma; (4) Hodgkin's disease, and (5) syphilis.

V. FASCIAL SPACE INFECTIONS

The fascial planes surrounding muscular, vascular and visceral structures are arranged anatomically to form potential spaces between their layers. These so-called fascial spaces may be the sites of abscess formation and may cause external swelling about the face and neck. Since these abscesses result from extension of infection in neighboring tissues, such as bone, lymph nodes and salivary glands, one does not allow a period of time to elapse before instituting incision and drainage as is done in cases of lym-

phadenitis wherein it is necessary to allow sufficient time for the breaking down of the glandular tissue.

Three important fascial spaces of the face have been described, the first of which is the parotid space, occupied largely by the parotid gland, which was considered previously.

The mandibular space, situated immediately under the body of the mandible and produced by the splitting of the cervical fascia into two layers, one of which attaches to the external and one to the internal surface of the mandible, is often of great interest to the oral surgeon. Abscess formation in this space is evidenced by swelling in the region of the body of the mandible and obliteration of the fornix. When this occurs, there is often an associated osteomyelitis of the body of the mandible.

The third fascial space of the face is the masticator space, which is bounded by the muscular fascia surrounding the masseter and pterygoid muscles contained within it. This may be invaded by a suppurative process extending directly from the mandibular space or from the posterior portion of the alveolus during postextraction infections. Swelling of the cheek over the angle of the mandible associated with trismus is an important clinical finding. In the pharynx, there may be noted a bulging at the lower part of the anterior faucial pillar. The infection may extend upward to either the superficial or the deep temporal pouches and cause swelling in the region of the zygomatic arch. This condition may be confused with zygomatic mastoiditis in which a subperiosteal abscess has been formed by the external rupture of infected zygomatic or squamous cells. The positive aural history, the evidence of suppurative otitis media and the roentgenographic changes of mastoid disease aid in the differential diagnosis.

VI. LUDWIG'S ANGINA

Ludwig's angina is a phlegmonous process between fascial planes in the floor of the mouth. Although the condition is rare, its frequent association with infection about the teeth and gums demands that it be considered in this discussion.

Anatomically, there are four potential spaces between planes of muscular fasciae in the floor of the mouth. These lie between the genioglossus and geniohyoid muscles above and between the geniohyoid and mylohyoid muscles below and are separated into four compartments by a fibrous median raphe. Infection may spread through lymphatic channels from the lower anterior teeth and gums, and occasionally from the lower lip to these spaces, with symptoms primarily those of profound sepsis associated with severe local signs of inflammation. As the disease progresses, the tongue becomes thick and swollen and is elevated to the roof of the mouth by the massive swelling and edema of the soft tissue in the floor of the oral cavity. Dysarthria and dysphagia result from the massive swelling of the tongue, while, in cases of large abscess formation, dyspnea due to the hypopharyngeal and laryngeal edema may supervene. Beneath the *symphysis menti,* there appears a hard sensitive swelling in which there can rarely be felt any fluctuation. Whether the external or the internal swelling is more pronounced depends on the location of the abscess in the lower or the upper fascial compartment.

VII. PERITONSILLAR ABSCESS OR QUINSY

Quinsy, or peritonsillar abscess, scarcely belongs in this group of conditions causing acute swelling about the face and neck, but, because of its occasional appearance in association with dental infection, it deserves mention. In most instances, quinsy is a complication of acute tonsillitis and it results from direct extension of infection through a tonsillar crypt to the peritonsillar space which lies between the tonsil and the fascia covering the superior constrictor muscle of the

pharynx. In this type of case, the classical picture of enlargement of a tonsil associated with swelling in the palate and edema and lateral displacement of the uvula is produced. This pus tends to migrate toward the upper pole of the tonsil through the loose areolar tissue of the peritonsillar space, rather than downward to where the tonsil is firmly attached to the fascia of the superior constrictor muscle.

Occasionally, a peritonsillar abscess follows injection of a local anesthetic for the extraction of a lower molar tooth. Infection may be carried into the base of the anterior pillar and peritonsillar space in that portion which is firmly attached to the underlying musculature. In such a case, the suppuration may run its entire course in a retrotonsillar position, since the pus does not reach the loose areolar tissue, which would permit its migration to the superior pole of the tonsil. Pain on swallowing or talking is intense and trismus is marked, being due to the splinting of the internal pterygoid muscle. Inspection reveals a red swollen and tender mass located at the base of the anterior pillar, associated with acutely swollen and tender lymph nodes in the superior deep cervical chain of glands. An incision through the base of the anterior pillar will usually effect a prompt cure.

VIII. PARAPHARYNGEAL SPACE INFECTION

Among the most important of the acute suppurative processes of the head and neck are those involving the pharyngomaxillary or parapharyngeal space, which have grave significance because of their proximity to vital structures. For a complete understanding of the anatomy of the parapharyngeal space, one must acquaint himself with the distribution of the cervical fasciae.

The etiology of abscesses in this space becomes more apparent in studying a cross-section of the neck at the level of the angle of the mandible. It is seen that the space is bounded anteriorly by the superior constrictor muscle of the pharynx, laterally by the internal pterygoid muscle and the inner prolongation of the parotid gland and posteriorly by the cervical spine and the muscles that cover the bodies of the vertebrae. It contains the carotid sheath, areolar tissue and a dense plexus of lymphatics. Thus, the anatomic location renders this space vulnerable to infections in the parotid gland, the masticator space, the vertebral bodies, the pharynx and retropharyngeal space and the deep cervical lymph nodes. Also, it provides an avenue of extension into the posterior mediastinum by way of the carotid sheath.

The four most important diagnostic signs of the disease are trismus, medial displacement of the tonsil and lateral angle of the pharynx, firm tender swelling and induration beneath the angle of the mandible and fever, which is frequently septic. Because of the depth of the abscess and the thickness of the overlying fascia, external fluctuation is seldom encountered.

Prompt incision, preferably by the external route, is mandatory to prevent such complications as septic thrombosis of the jugular vein, rupture of the carotid artery and mediastinal abscess.

GROWTH AND DEVELOPMENT OF THE DENTAL ARCHES IN CHILDREN

By JOSEPH T. COHEN, D.D.S., Minneapolis, Minn.

THE purpose of this study was to help determine, if possible, the changes in the dental arches incident to growth and development. A longitudinal study was made on a large group of children, of which twenty-eight were selected for this report, covering a period of eleven years. Study casts were made annually and were measured, some of the measurements being predicated on the fairly well-established assumption that the position of the teeth and the rate of their growth have an influence on the growth and development of the arch.

The project, which was begun at the Institute of Child Welfare, University of Minnesota in 1926, has been carried on without interruption and is being continued with the help and guidance of John E. Anderson, director of the institute, and Richard E. Scammon. The Institute of Child Welfare maintains an experimental nursery school and kindergarten with an enrolment of approximately fifty children ranging in age from 2 to 6 years and from all walks of life. They are evenly divided as to sex and are fairly representative of the population, and they are readily available for study. After completing their course at the institute, these children returned periodically for the purposes of this study.

The method of growth of the dental arch and the period in which it occurs have interested many investigators, and much speculation has arisen as to factors in growth and development. As a result, the problem has been attacked from many angles of research.

According to Cunningham,[1] the mandible begins to calcify in the sixth week of fetal life, being the second bone in the body to calcify, the clavicle being first and the maxillae third.

Brash,[2] in his interesting observations on a pig fed on madder, found that there is a constant movement of all the teeth of the pig labially in the alveolar border during the growth period. This eruption is the manifestation of the movement of the mandible which begins long before birth and continues long after. The general conclusion is that the alveolar arches are constantly changing.

Thoma[3] says:

> It seems, therefore, that by animal experimentation, three theories have been developed regarding factors which augment inherent growth tendencies. These may be summarized as follows:
>
> 1. The development of the jaws is due principally to occlusal force during mastication.
>
> 2. The development of the jaws is governed principally by the development of the teeth.
>
> 3. The development of the jaws is fostered principally by muscle activity. . . .
>
> The mandible develops to normal facial proportions in anodontia when deciduous and

From the Institute of Child Welfare, University of Minnesota.

Read before the Section on Therapeutics, Pathology and Research at the Seventy-Fifth Annual Midwinter Meeting of the Chicago Dental Society, February 14, 1939.

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permanent teeth are congenitally missing; it develops to normal size when the entire set of teeth is formed but remains unerupted and impacted, but it fails to develop and remains considerably undersized in cases of early acquired ankylosis with muscle function reduced to a minimum.

Scott,[4] in his observation on the growth of the mandible in a dog, found that the greatest amount of growth took place in a region in which the most powerful of the muscles of mastication have their sites of attachment; which supports the hypothesis of Thoma that muscle activity is the most powerful intrinsic influence in the development of the length of the jaw.

Todd,[5] in discussing general principles of human growth, states:

We usually think of growth as increase in *dimension* and, if the phrase is carefully safeguarded, so that it refers to localized dimensions as well as those of the entire body, then increase in dimension is at least the most obvious expression of growth.

Growth, therefore, involves three concepts: (1) increase in dimension, (2) increase in proportion and (3) adjustment of the parts.

Hellman,[6] writing on the growth of the human face, points out that the study of growth of the face and the meaning of increases in dimension must be clearly understood; that the face, as it is represented by his study, grows by increase in size in three directions: (1) vertical, (2) transverse and (3) anteroposterior, and that the same planes at different levels grow at different rates. He arranges growth stages of the face serially, not primarily according to chronologic stages, but according to the sequence of eruption and shedding of deciduous teeth and the appearance of the permanent teeth.

Those investigators who have been studying the growth and development of the bones of the face and the growth of the face do lay a great deal of stress and importance on the relationship of the growth, development and eruption of the teeth, and it is, therefore, believed

MEAN MEASUREMENTS FOR EACH AGE GROUP OF CHILDREN STUDIED.

ARCH WIDTH IN mm.

UPPERS

AGE	From cuspid to cuspid				1st pre-molar to 1st pre-molar				2nd pre-molar to 2nd pre-molar				1st permanent molar to 1st permanent molar				Cuspid to 2nd pre-molar			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
3.6	29.3	1.9	28.1	1.5	29.5	1.8	28.4	1.8	34.0	1.5	33.6	2.5					22.9	.7	22.8	1.0
4.6	29.4	1.9	28.7	1.6	30.3	2.2	29.0	1.8	34.4	1.7	33.5	2.2					23.1	.7	23.0	.9
5.6	29.6	2.0	29.1	1.6	30.0	1.8	29.3	1.8	34.6	2.0	33.8	2.0			42.3		22.9	.7	22.9	.9
6.6	30.3	2.3	30.1	1.9	30.3	1.8	29.9	1.6	34.9	2.0	34.2	2.0	39.2	2.5	40.1	2.6	22.7	.7	22.6	1.0
7.6	31.6	2.0	30.9	1.8	31.2	2.1	30.3	1.6	35.2	2.1	34.4	2.1	39.6	2.3	40.0	3.0	22.5	1.0	22.4	.9
8.6	32.4	1.9	31.3	2.1	31.4	2.1	30.6	1.6	35.5	2.0	34.6	2.2	40.1	2.4	40.1	2.8	22.2	.8	22.1	.8
9.6	32.7	2.1	31.7	2.0	31.2	2.0	30.8	1.8	35.7	2.2	35.1	2.4	40.3	2.5	40.7	2.8	22.1	.9	22.1	.8
10.6	33.2	2.6	32.2	2.1	31.1	1.8	30.8	1.8	35.9	2.5	35.4	2.5	40.5	2.5	41.0	2.9	22.4	1.1	21.9	1.3
11.6	33.8	2.3	32.8	2.1	31.2	2.0	30.5	1.6	35.7	2.7	35.4	2.4	40.8	2.5	41.3	2.4	22.7	1.2	22.1	1.5
12.6	34.4	2.0	33.2	2.4	31.7	2.1	30.7	1.8	35.9	2.7	35.3	2.5	41.0	2.1	40.9	3.0	22.8	1.4	22.3	1.7
13.6	34.8	1.6	33.1	1.9	32.1	2.0	31.7	1.7	36.1	2.8	34.8	2.2	40.7	2.7	41.3	3.3	22.7	1.5	21.7	1.4

LOWERS

3.6	23.4	2.9	21.9	1.3	25.9	1.2	25.6	1.7	29.5	1.3	28.5	2.0					23.7	.8	24.0	1.2
4.6	23.4	2.3	22.3	1.3	26.0	1.0	25.9	1.7	29.5	1.3	29.0	2.0					23.7	.8	23.9	1.1
5.6	23.9	2.4	22.7	1.2	25.9	.7	26.1	1.7	29.6	1.2	29.3	1.9			36.1		23.6	.8	24.0	1.1
6.6	24.9	2.9	23.6	1.1	26.2	.9	26.4	1.6	29.9	1.3	29.7	1.9	36.0	1.8	36.1	2.6	23.3	.9	23.7	1.0
7.6	26.1	3.0	24.6	1.4	26.7	1.0	27.0	1.6	30.2	1.3	30.1	2.0	34.5	1.9	36.5	2.8	23.1	.9	23.5	1.4
8.6	26.5	2.9	25.1	1.6	27.2	1.0	27.5	1.7	30.4	1.4	30.4	2.0	34.8	2.1	36.8	2.9	23.0	1.1	23.2	1.6
9.6	26.4	3.0	25.5	1.5	27.5	1.8	27.8	1.6	30.8	1.6	30.6	2.0	34.9	2.1	37.2	3.2	22.9	1.1	23.0	1.8
10.6	26.3	2.9	25.6	1.4	28.0	1.6	28.0	1.7	30.7	1.7	30.6	2.0	35.1	2.2	37.3	3.3	22.8	1.0	22.6	2.3
11.6	26.6	2.8	25.5	1.6	28.0	1.3	28.4	1.8	30.7	1.7	31.4	1.8	35.2	2.2	37.4	3.4	22.5	1.0	22.1	2.2
12.6	26.5	2.8	25.5	1.9	28.2	2.0	27.9	2.0	30.9	1.9	31.1	1.8	35.2	2.2	36.9	3.0	22.3	.9	22.2	2.3
13.6	26.5	2.9	25.3	2.0	28.5	1.0	27.9	1.5	30.5	2.2	31.3	1.5	35.0	2.5	37.0	3.5	21.6	.4	21.9	2.0

that, in general, the position and the eruption of the teeth are important factors in the growth and development of the arches of the face.

Bogue,[7] Bonwill,[8] Hawley[9] and Gilpatrick[10] are among those who have attempted predetermination of the size and shape of the dental arch. In his work on articulation of the teeth, Bonwill examined 4,000 dentures and 6,000 skulls, from these observations establishing as a standard an arch based on an equilateral triangle conforming closely to the most nearly perfect arches found. This work

In an examination of 5,000 upper dentures, Gilpatrick found, in 90 per cent of the cases studied, that "tooth substance" (across the incisal portion of the arch) from the buccal pit of the upper right first molar to the buccal pit of the upper left first molar measured between 82.5 mm. and 89.5 mm. He concluded, therefore, that predetermination of the dental arch, containing both complements of teeth and mixed dentures, is practical and hopeful, and he designed arches to be placed on the cast in order to determine where, how much and in which

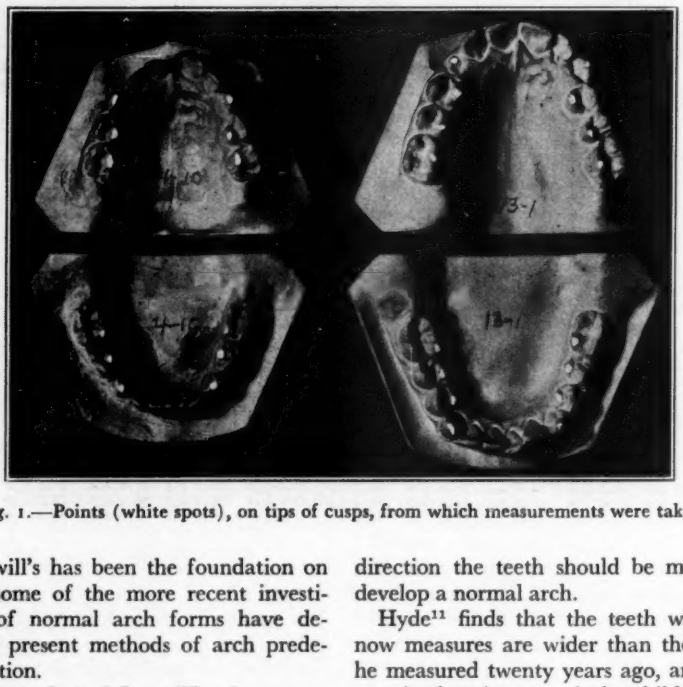

Fig. 1.—Points (white spots), on tips of cusps, from which measurements were taken.

of Bonwill's has been the foundation on which some of the more recent investigators of normal arch forms have developed present methods of arch predetermination.

Hawley adapted Bonwill's plan to orthodontic uses. In the charts prepared by Hawley, the six anterior teeth are arranged in the arc of a circle, the diameter of which is taken from the combined width of the central incisor, lateral incisor and cuspid teeth. The remainder of the arch is determined by consulting his geometric plan.

direction the teeth should be moved to develop a normal arch.

Hyde[11] finds that the teeth which he now measures are wider than those that he measured twenty years ago, and he is certain that, in general, the children that he knows now have larger teeth than those he knew twenty years ago. This, in his opinion, is one of the reasons for the increase in cases of malocclusion. Thus, we find that the teeth themselves are an important factor in the shape, size and development of the dental arches.

Most investigators who have attempted

to establish a norm or mean for the growth and development of the dental arches have selected a large number of individuals from each age group. In this way, they have established a series of norms representative of the various measurements of the arches at different ages.

Several investigators, however, have attempted to establish mean development and mean growth curves for the arches by making longitudinal records; that is, by taking measurements of the same children over a period of years. Wallace,[12] for example, has a series of fourteen casts obtained from one patient at various stages of growth, beginning at $3\frac{1}{2}$ years of age and concluding at 24. These casts were carefully measured in an attempt to study the growth of the dental arches.

Stanton and Goldstein,[13] Lewis[14] and others have been observing the development of the dental arches and securing study casts at regular intervals in the same cases over a long period of years. Their purpose was twofold: to establish a normal growth curve for the dental arches of these children and to attempt to determine the reason for malocclusion and underdevelopment of the arches.

As previously stated, longitudinal growth curves were obtained for twenty-eight children, fifteen of whom were boys and thirteen girls. Study casts were made annually. In all, there were 271 casts for this entire group, covering the ages of $3\frac{1}{2}$ to $13\frac{1}{2}$ years. For some of these children, records were obtained over a longer period of time, but it was thought that this age limit would adequately cover the period of growth during which the teeth were erupting and show the development of the arch during the transitory period from deciduous to permanent teeth.

Since the children at the Institute of

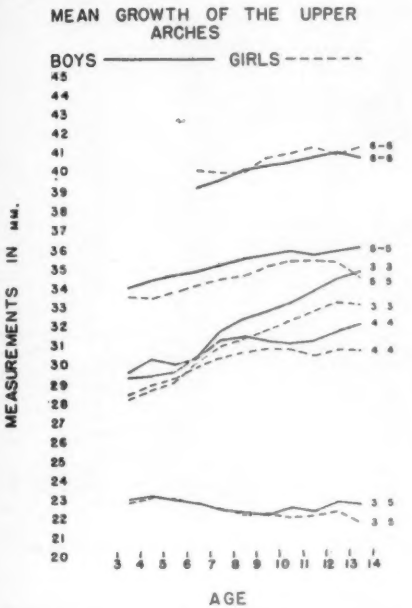

Fig. 2.—Mean growth curves of upper arches of children studied.

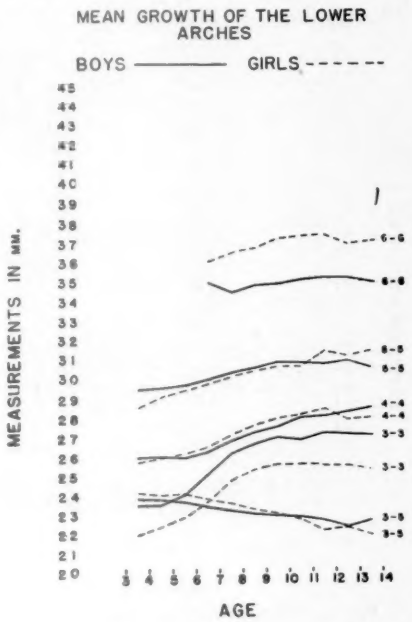

Fig. 3.—Mean growth curves of lower arches of children studied.

Child Welfare, at the time that their series were started, were selected on the basis of socio-economic status and mental and physical development as a representative cross-section of the population of the city of Minneapolis, the problem of obtaining typical cases was already solved for us. At the time that the study was begun, the subjects ranged in age from 2 to 3 years and, at that time, they all had fairly normally developed dental arches. Different forms of irregularity did occur later in some of the arches, but none of these children had extended orthodontic treatment, nor did they have space maintainers placed because of premature loss of deciduous teeth. Two children had orthodontic treatment, but this treatment had no effect on the development of the arches.

Different investigators studying development of the dental arches have used different points from which to establish their measurements. Some used a line from a point on the gingival margin on the lingual side of a tooth on one side of the arch to the gingival margin on the lingual side of the corresponding tooth in the other side of the same arch. Others used a point on the buccal gingival margin. Still others used the pits of the teeth from which to take their measurements. Some used the tips of the cusps, and some established the centric point on a given tooth from which to measure.

It was felt that the measurements taken from definite cusps to corresponding definite cusps were very reliable; consequently, that was the point of measurement used in this study. All teeth having but one cusp (such as the cuspid) were measured from the tips of the cusps. All teeth with two cusps were measured

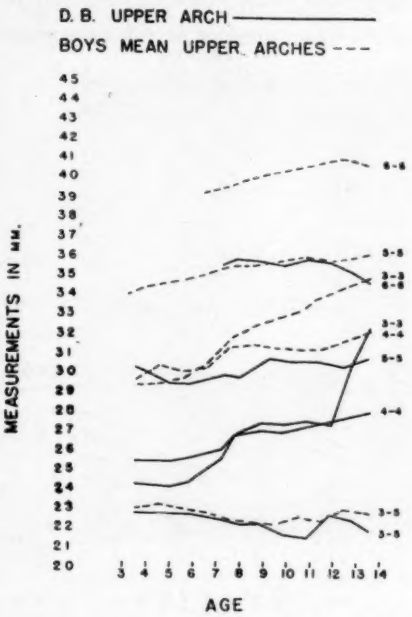

Fig. 4.—Comparison of lateral maxillary growth of D. B. with that of mean of all boys studied.

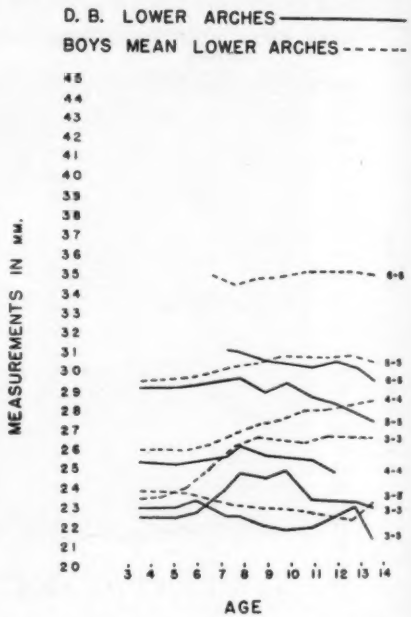

Fig. 5.—Comparison of lateral mandibular growth of D. B. with that of mean of all boys studied.

from the lingual cusp, and those teeth with more than two cusps were measured from the mesial-lingual cusp to the mesial-lingual cusp of the corresponding tooth on the opposite side of the arch. In Figure 1, the various points from which the measurements were taken are shown in white ink.

In the upper arch, five different measurements were taken: (1) from the tip of the cuspid on one side of the arch to the tip of the cuspid on the other side of the arch; (2) from the lingual cusp of the first deciduous molar on one side of the arch to the lingual cusp of the first deciduous molar on the opposite side of the arch; (3) from the mesial-lingual cusp of the second deciduous molar on one side of the arch to the mesial-lingual cusp of the second deciduous molar on the opposite side of the arch; (4) from the mesial-lingual cusp of the first permanent molar on one side of the arch to the mesial-lingual cusp of the first permanent molar on the opposite side of the same arch, and (5) from the mesial side of the cuspid at the gingival margin to the distal side of the second deciduous molar at the gingival margin on the same side of the arch.

The same series of measurements were taken for the lower arch. After exfoliation or loss of the deciduous tooth, the corresponding cusp of the permanent tooth was used for the measurement of the arches. Each measurement was taken independently by three different operators, and the results were carefully checked, in order to eliminate as much error as possible in the taking of the measurements and in the establishment of the points from which the measurements were taken.

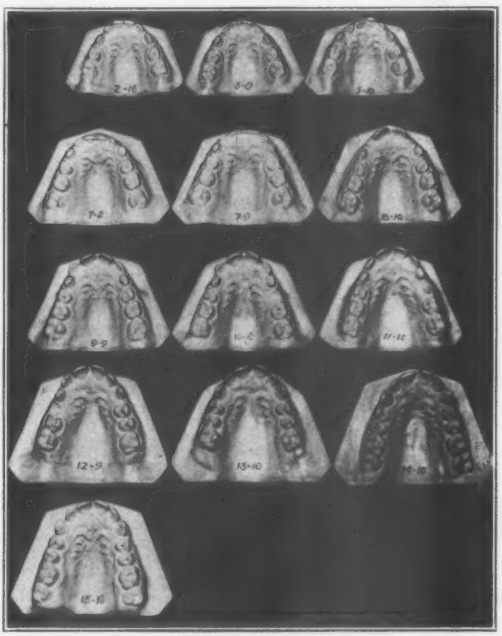

Fig. 6.—Maxillary casts of D. B. from 2 years and 10 months to 15 years and 10 months.

Because of necessary absences of the children and circumstances over which we had no control, obtaining each suc-

ceeding cast for every child at the exact time we wished between each two age periods presented problems. Therefore, in establishing the mean growth curves, it was necessary first to plot the growth curves for the various measurements for each individual on large scale cross-section paper. From these curves, the measurement corresponding to the half year point between birthdays was read. This is a method of graphic interpolation. After these points were determined, the resulting figures were averaged, and the means and standard deviations determined. Since this was done for every point, and the same cases were carried through from $3\frac{1}{2}$ years to $13\frac{1}{2}$ years, errors due to differential selection at different age levels were eliminated. In this respect, our data are superior to those frequently used. This is considered a sound statistical method of developing this type of curve.

Figure 2 shows the growth development of the upper arches. The heavy line represents the mean measurements of the boys and the broken line represents the mean measurements of the girls. The arch is somewhat wider between the first permanent molars (6-6) of the girls than that of the boys at the same age. There is little lateral growth in this part of the arch.

The growth curve of the boys and of the girls, from cuspid to cuspid (3-3) and from deciduous molar to deciduous molar (4-4) appears to follow about the same pattern, with a consistently larger arch development for the boys than for the

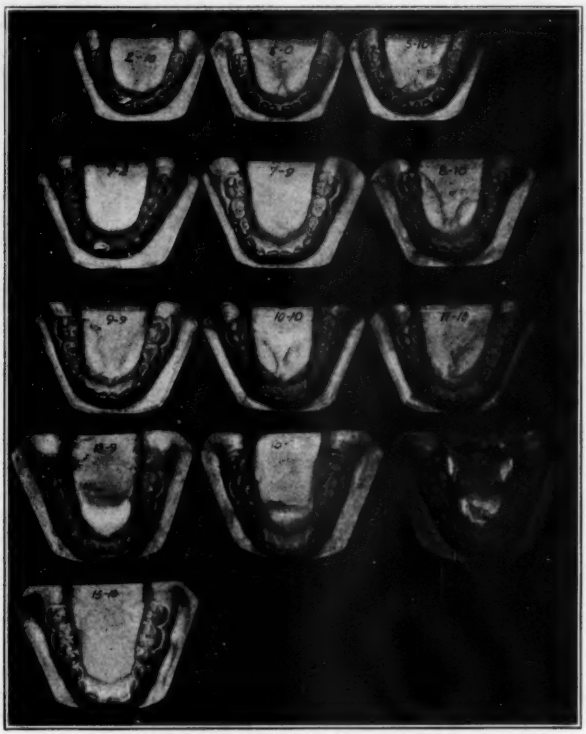

Fig. 7.—Mandibular casts of D. B. from 2 years and 10 months to 15 years and 10 months.

girls. There appears to be some little growth between the second deciduous molars (5-5) on both sides of the arch and between the first deciduous molars on each side of the arch, and there is a quite definite growth in the cuspid area of the upper arch. This growth spurt occurs in both boys and girls at from about 6 to 8 years of age, which corresponds approximately with the time of eruption of the upper incisors. These findings agree in general with those of Lewis except that according to his findings there was a complete cessation of growth between 9 and 10½ years, while our findings showed continued growth, but in a lesser degree, up to the twelfth year.

Between the mesial side of the cuspid and the distal side of the second deciduous molar, there appears to be no growth, and it might be said that the space is shorter at 13½ years than it is at 3½ years of age.

Figure 3 shows the mean growth curve of the lower arch, the heavy line representing the boys and the broken line representing the girls. Here again, there seems to be a consistency in the pattern of the growth curve between boys and girls. It will be noted, however, that the mandible in the molar region is considerably wider in the girls than it is in the boys. It was noted that the size of the upper arch of the girls was slightly larger than that of the boys, but, in the lower arch, there is a more distinct difference. The remaining measurements of the arches of the boys and the girls are

Fig. 8.—Maxillary and mandibular casts of D. B. in occlusion.

about the same, with the exception that the boys' arches again are wider in the cuspid area than those of the girls.

There seems to be little lateral growth in the molar region and in the region of the second deciduous molar. A little growth appears between the ages of about 6 and 10, in the first deciduous molar region, but a consistent and definite growth period appears in the cuspid region between the ages of 5½ and 8½, or during the period in which the lower permanent teeth are erupting.

After the nine-year period, there seems to be no lateral growth in the cuspid area in either the girls or the boys. Until the age of 10½, the curve closely follows the findings of Lewis, but, from then on, his subjects developed another spurt in growth, while ours showed no further lateral development in the cuspid area. The difference between the mesial side of the cuspid and the distal side of the second deciduous molar in the lower arch consistently becomes smaller, the size at 13½ years being about 2 mm. narrower than at 8½ years of age. This is according to what one would expect, since the permanent premolar which replaces the second lower deciduous molar is considerably smaller, and there is a mesial shift of the molar and perhaps a distal shift of the anterior teeth to close up this space.

It may be of interest at this point to show the different types of patterns of arches that boys and girls develop. The girls' arches are narrower in the anterior portion of the arch or in the cuspid region than the boys' are, but the girls' arches are wider in the posterior, or first permanent molar, region. Thus, the boy's arch is more rounded; the girl's more v-shaped. This was an interesting observance of this study.

The accompanying table gives the mean measurements of the arches in detail, showing the lateral dimensions from the points measured, with the standard deviation for each measurement.

These mean growth curves may frequently be helpful in determining what a normal arch should be, and, in many instances, they might be of considerable practical value. However, there are frequent occasions in which arches develop normally along diverse patterns, and it would be foolhardy to attempt to fit these cases to the mean pattern of growth as developed for any particular group of children. In other words, these mean curves indicate a tendency: they do not determine individual variations from the norm.

Figure 4 illustrates a case in point. Here, the broken line representing the mean curves for the upper arch of all the boys in the study is compared with the growth curve of one boy, D. B., represented by the heavy line. His arch is considerably narrower than that of the mean developed for the entire group of boys, although it does seem to follow the same general pattern.

The measurements from the cuspid to the second premolar do not show quite the variation from the mean as other growth curves do, but they show some.

Figure 5 shows the growth curve of the lower arch of D. B. as compared to the mean. There is considerable difference particularly in the lateral measurement between his growth curve and that of the mean growth curve for all the boys and the cuspid to second premolar measurement does not show such extreme differences as do the other measurements.

It is observed (Figure 4) that although D. B.'s upper arch dimensions are considerably smaller than those of the mean, the general curve of growth is about the same. In the lower arch, a different situation has developed: the first permanent molar to first permanent molar measurement follows about the same curve as the mean measurements. In the first premolar to first premolar measurement, the curve up to the age of about 7½ follows the mean and then the lower arch

gets small as compared to the upper arch, which shows some growth.

In the measurement from second premolar to second premolar, the same situation has occurred. Up to the age of about 7½, the arch measurements follow a similar curve, and then D. B.'s arches become narrower. The curve in the cuspid-to-cuspid measurement is peculiar. The cuspid to cuspid width in the normal arch shows a steady increase until the age of about 8½, when it reaches a plateau where no further growth occurs. In our study, growth continues until 13½ years. However, in D. B.'s lower arch, there is growth until about the age of 7½, when a plateau of no growth is reached. This is not unusual. There is then a definite decrease in the width and another period of no growth. This is a peculiar curve. Let us for a moment consider what has occurred to make it so.

When D. B. was 2 years and 10 months old, the first impressions were taken and a lingual version of all the upper teeth on the right side was revealed. This condition continued until the age of 7, when the first permanent molars erupted in their normal buccal-lingual relations. On eruption of the permanent cuspids and premolars, the buccal-lingual relationship corrected itself, and though D. B. still had a narrow arch, the relationship of the upper and lower arches was greatly improved. It appears that the upper arch did not expand to accommodate itself to the relationship, but rather that the lower arch became narrower.

Now let us examine this boy. He is tall, rather thin for a boy 15 years of age, with a comparatively long narrow face. His teeth and arches articulate well and his appearance is quite good. Figure 6 shows the development of the upper arches. The teeth are well placed except for a slight narrowing in the premolar region. The lower arches (Fig. 7) present a similar picture. Should one attempt to change the proportions of this arch to that developed as a norm, the appearance would be considerably altered, and probably not for the better. Figure 8 shows the arches in occlusion.

CONCLUSIONS

1. The greatest lateral growth in the dental arch occurs in the cuspid area.

2. In the cuspid area, the greatest growth occurs during the eruption of the permanent incisor teeth.

3. The distance between the lower cuspids reaches its maximum at eight and one-half years and from then on there is little growth. Acceleration of growth between the upper cuspids is greatest at from 5 to 8 years, a slow steady growth continuing until the age of about 12 years. In the period studied, there is little lateral growth of the arches between the first permanent molars and only a slight growth of the arches between the premolars.

4. The distance from the mesial side of the upper cuspid to the distal side of the second premolar on the same side becomes somewhat less in the upper arch. In the lower arch, there is a definite decrease in this dimension.

5. The dental arches of girls, and particularly the lower arches, are wider in the posterior section than those of the boys, but narrower in the anterior section.

6. Graphs made of different individuals indicate that there is a wide variation in development of the dental arches, and that individual children often depart from the pattern described.

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TWO-SURFACE INLAYS FOR BRIDGE ABUTMENTS

By HAROLD J. CUTLER, A.B., D.M.D., Boston, Mass.

THERE is no multiple restoration available to the profession that approaches in service, appearance and comfort a fixed bridge.

A bridge, both abutments of which are soldered, requires preparation the slices, grooves and pins of which must be parallel. Torque and leverage require a maximum of retention and a fairly even distribution of retention lest one abutment wrench the other loose. Full or three-quarter crowns, inlays with extensive preparation and coverage are necessary. When it is comparatively simple to meet such requirements, fixation of both ends of the bridge to the abutments is preferable.

However, there are cases in which the fulfilment of such conditions would seem inadvisable. Abutments without previous operative procedure, abutments of excessive contours or of an inclination that would necessitate gross mutilation to assure that the supports were parallel can be successfully handled with two-surface inlays, but only if used with a broken stress assembly. By that, I mean with only one of the two contacts between pontic and abutment to be soldered, the other connection to be a mechanical support without physical union. Sufficient retention for two-surface inlays can be obtained without excessive cutting by parallelism within the preparation and the addition of locks, pins and grooves where possible.

There are two types of broken stress assembly with slight variations of each to suit the individual case: (1) the occlusal lug rest and (2) the contact point lug rest.

The occlusal lug rest is a groove, not over 12 gage, cut through the marginal ridge parallel to the occlusal surfaces and in line with the centers of the abutment teeth. A simple groove, with flat or rounded floors, will give adequate support for the normal stresses of occlusion. To prevent separation of the abutments, a dovetail or lock is necessary. Abutments without tooth contact mesially or distally to the abutments, or with a bite that tends to drive either support from the other, should be retained with such a

lock. All corners and angles of the groove should be rounded. Abutments may be cemented separately.

A contact point lug rest is a hole placed at the contact point just below the marginal ridge parallel to the occlusal plane and in line with the centers of the abutment teeth. To prevent drifting of abutments, in this type of lug support, the type of rest is preferable for upper restorations in that it eliminates the possibility of the lug's sagging from its socket, as might occur with an occlusal type rest. It is necessary that these preparations be approximately parallel, for both abutments have to be cemented at the same time.

The lugs to occupy such holes or

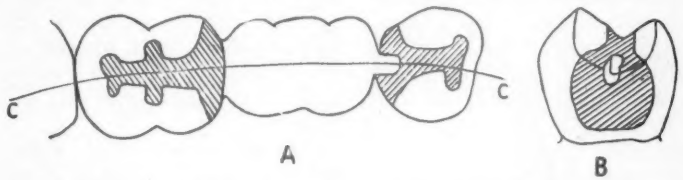

Fig. 1.—A, broken stress bridge, occlusal lug support; distoclusal inlay in bicuspid, mesioclusal inlay in molar. B, simple groove through marginal ridge, approximately 12 gage, in line with centers of abutment teeth, C-C, (A), and parallel to occlusal surface.

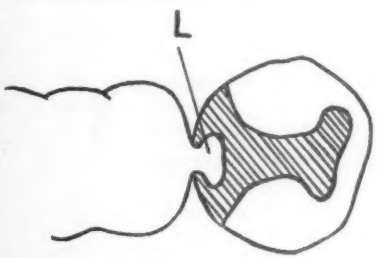

Fig. 2.—Dovetailed groove or pin-locked recession.

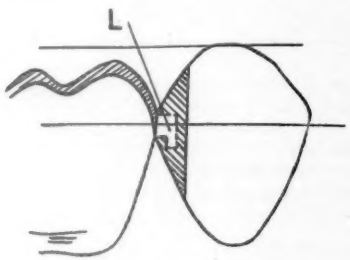

Fig. 3.—Prevention of separation of abutment teeth by pin-locked recession.

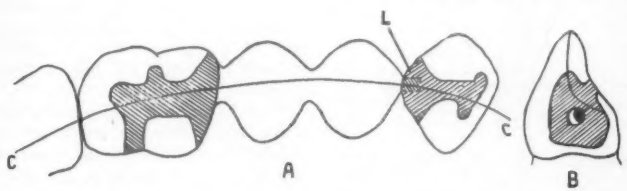

Fig. 4.—A, broken stress bridge, contact lug support; distoclusal inlay in cuspid, mesioclusal inlay in molar (palatal extension). B, hole approximately 13 gage at contact point in distal surface of cuspid inlay in line with centers of abutment teeth, C-C, (A), and parallel to occlusal surface.

hole should be prepared in line with the centers of the abutment teeth, but at an angle with the occlusal plane. The hole may vary in size up to 12 gage, the size depending on the load required. This grooves may be cast with the adjoining pontic or may be made of wire of proper size, onto which the adjoining part is cast.

In most cases, the pontic best suited

for fixed prosthesis is the long round platinum pin facing, modified with porcelain saddle or knob for tissue contact.

Wherever an occlusal surface of a pontic is to be restored, two abutments are necessary for support.

The lug of a broken stress bridge should never be placed in an amalgam filling. The use of a small round wire, resting on the occlusal surface of a sound tooth, as one support, in selected cases, is permissible. In an otherwise normal and well-cared-for mouth, the restoration of an occlusal surface to a pontic, replacing a missing first bicuspid, and thereby necessitating mutilation of a sound cuspid for dual support, is of questionable value. A cantilever bridge with a facing, using one support, would be preferable.

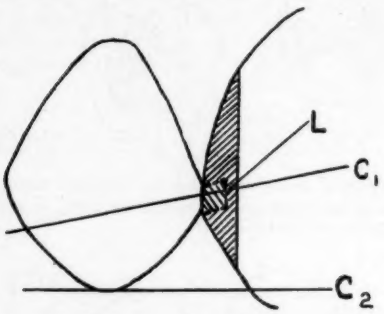

Fig. 5.—Hole approximately 13 gage at contact point of cuspid inlay in line with centers of abutment teeth, C-C, A (Fig. 4), but at an angle to occlusal surface, line C_1 to prevent separation of abutments. Preparations should be approximately parallel, as the abutments have to be cemented at the same time.

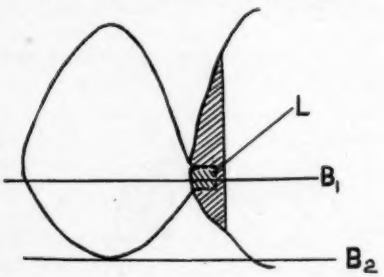

Fig. 6.—Hole at contact point parallel to occlusal surface, offering sufficient support, but not preventing separation of abutments.

The force of the lower anterior against the upper anterior teeth is outward from a center as in the lines of the spokes of a wheel. Therefore, lugs without locks, even in prepared inlay grooves, do not prevent separation of the abutments. Lugs on the inclined surfaces of unprepared anterior teeth do not materially support an edge-to-edge bite or prevent separation.

The mutilation necessary to prepare an anterior inlay for a locked bridge lug on a sound proximal surface should be carefully considered as against any possible danger resulting from a cantilever bridge without lug support.

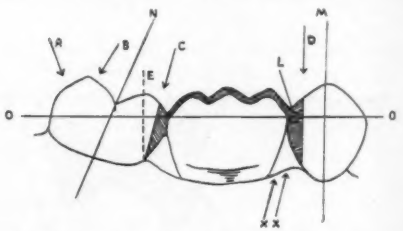

Fig. 7.—Lower broken stress bridge; abutment N inclined mesially in relation to abutment M. To parallel preparation on abutment N with preparation D on abutment M would necessitate a mutilation along line E. A more conservative preparation on abutment N along line C necessitates only paralleling anterior surfaces of pontic and lug xx. Abutments are cemented separately.

The force of the bite along line A would drive the abutments together. The force of a bite along line B would separate abutments and so require a lug lock.

I realize that I have left myself open to criticism, but such procedures, when not abused, have proved their worth.

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A METHOD THAT SIMPLIFIES THE DESIGN OF PARTIAL DENTURES

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INTRODUCTION

PARTIAL dentures must be planned by dentists. No longer can we presume that the practice of partial denture prosthesis, and many other technical treatments in the field of dentistry, can be controlled safely by the dental profession if their fabrication, and in many instances their design and plan, are executed by those who have had no technical or scientific education in dentistry. How can we regard partial denture prosthesis as a health service if we permit the service to be rendered by those who have had no training in the biologic sciences?

Partial denture service is a health service. It is needed by the majority of people who have reached middle age. It is a preventive health service because, when the masticatory efficiency is improved, gastrointestinal disturbances may be prevented and the usefulness of the remaining natural teeth may be prolonged.

McLean,[1] in 1935, said:

> In the attempt to stem the tide of dental disease by skilful restorations, we must admit that we have failed. Not only have we failed, but in our struggle to perfect our methods, we have devised such skilful, scientific, time-consuming technics that the cost of dentistry is becoming prohibitive to the masses.

This statement, because of its implications, has been a constant source of stimulation to me. According to economic statistics, only 3 per cent of the people in the United States can afford to pay more than average fees for dental services. As dentists, we believe that the public could pay more for their dental services if they recognized that dental care is a necessity and not a luxury.

Complicated designs and complex and intricate fabrications that are time-consuming have made the cost of partial denture service prohibitive to the masses. The more simple type of partial denture has become too costly because of the manner in which the services have been rendered. The majority of partial dentures can be planned and constructed in the dental office with less expense to the patient than the present manner of construction, which requires meeting two "overheads." The financial return to the dentist would be increased, since it would be possible for the dentist to serve a greater number of patients.

While the construction of a partial denture may involve more time than the construction of an inlay, the procedures of construction are no more complicated. The office assistant who is capable of constructing a gold inlay can likewise construct a partial denture after it has been planned and designed by the dentist. The pouring of casts, the duplication of models, the waxing of patterns, the investment of waxed patterns, the firing of molds and the casting and finishing of partial dentures are procedures that are not too technical for execution by the average dental assistant.

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Read before the Section on Partial Denture Prosthesis at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 20, 1939.

In my opinion, for the majority of dentists, the planning and the designing are the most difficult steps in the construction of partial dentures. I shall outline a procedure which will simplify partial denture construction so that it can be executed in the dental office.

THE DESIGN OF PARTIAL DENTURES

In discussing the design of partial dentures, it is presumed that the dentist recognizes the importance of the biologic factors that are involved. In the majority of instances, teeth are lost because of a local or general pathologic involvement; therefore, it is essential that the biologic factors be considered before the partial denture is designed. It is necessary to remove, or reduce to a minimum, the causes of the loss of the teeth that are being replaced.

Recognizing the biologic limitations of the case, the dentist will proceed with caution in executing the design of the partial denture so that the strain on the remaining natural teeth and the supporting structures will be within the physiologic limits of the case. Therefore, a complete examination of the patient should be made, including the oral cavity, before the partial denture is planned. Operative, surgical or prophylactic procedures that may be needed should be completed.

On many occasions, dentists have asked me to design partial dentures on plaster casts which they have brought to dental meetings. Many of these casts have been constructed from snap impressions. They have not been transferred to an anatomic articulator and they have not been surveyed; nor do the dentists have x-ray pictures or any other record of examination studies of the patient. When the design of partial dentures is drawn on master models or plaster casts, it should be kept in mind that the casts represent living tissue, and that the design must incorporate the biologic and mechanical understanding that the dentist has of the case. If the partial denture is not designed in this manner, it cannot be expected to render satisfactory service.

It is necessary that all parts of the partial denture be recognized as of equal importance. Too often, in our desire to design and construct the right type of retainer, we forget that the function of the retainers can be satisfactory only if the other parts of the partial denture are planned to function with the retainers. The lingual bar, the palatal bar, the bases and the artificial teeth must be planned so that no one part of the partial denture will be weaker than any other part. It has been interesting to observe how little attention many dentists give to the arrangement of the artificial teeth in the construction of partial dentures. They have been careful to observe the establishment of equilibrium so far as the parts of the partial denture are concerned, only to nullify the advantages which they have gained by so arranging the artificial teeth that injury will result to the underlying structures. These facts have been mentioned to make it clear that it is not possible to design a partial denture by any method without giving consideration to all of the factors involved.

The palatal and lingual bars must be planned and constructed to be rigid in order to prevent undesirable movements of the teeth. The bases, or saddles, should be larger than they are usually made, so that the force of mastication exerted on the artificial teeth may be distributed to a larger area of the underlying bone. It may be necessary to narrow the artificial teeth buccolingually, or to decrease the length of the cusps so that the torque upon narrow ridges can be reduced. Usually, clasps are regarded as the retainers of partial dentures. Certain parts of the clasps do prevent vertical displacement of the partial denture in an occlusal direction. However, this is not the most important function of the clasp. The amount of retention necessary to

overcome vertical displacement in an occlusal direction should be kept to a minimum and needs to be only sufficient to overcome (1) the adhesive qualities of ordinary foods, (2) the "lift" or "pull" of the soft tissues and (3) the weight of the partial denture.

Partial dentures in function may move in many directions. They may move horizontally, from side to side; they may move vertically, up or down, or they may rotate around one of the several axes of rotation. The movement of the partial denture depends on the direction of approach and the amount of the displacing force. When the plan of the partial denture is executed, these various movements of the partial denture must be kept in mind so that the partial denture will be a rigid body capable of movement as a unit only.

For this reason, I believe that the majority of partial dentures can be planned in a simple manner and still render as satisfactory service as many of the more complex designs requiring the use of precision type retainers and stress-breakers. To be able to design partial dentures so that all the complex stresses that are induced during function of the partial denture and its supporting structures could be equalized, and to keep these stresses within the physiologic limits of each case, would be ideal. This is seldom accomplished, yet the attempt should be made to attain this objective.

When partial dentures are designed, the attempt should be made to establish a state of equilibrium among the movements of the partial denture, the remaining natural teeth and the underlying supporting structures. Since the clasps are the most important part of the partial denture that rests upon the teeth, they must be planned to resist in part the movements of the partial denture. In order of importance, the functions of clasps are to resist (1) the horizontal, or side to side, displacement of the partial denture, (2) the vertical displacement in a gingival direction, (3) rotation of the partial denture and (4) vertical displacement in an occlusal direction.

These functions of the clasp are performed by the several parts of which they are constructed, whether of wrought or of cast metal. The first part of the partial denture, the occlusal rest, or resister, prevents vertical displacement of the partial denture in a gingival direction. The occlusal rest, or resister, by preventing displacement of the partial denture in a gingival direction prevents also (a) displacement of the various parts of the clasp from the position on the tooth or tissues which they were to occupy, (b) loss in the occlusal relation of the artificial teeth of the partial denture and the opposing teeth and (c) concentration of the occlusal forces on the edentulous areas.

The second part of the clasp, the active bearing, prevents vertical displacement of the partial denture in an occlusal direction. This bearing is the part of the clasp that assures the "hook" or "catch" effect of the clasp. It should always exert a slight pressure upon the teeth.

The third part, the reciprocal bearing, prevents movement of the natural tooth that might be caused by the pressure exerted upon the tooth by the active bearing.

The fourth part, the lateral resister, prevents side-to-side movement of the partial denture.

The fifth part, the equalizer, prevents rotating movements of the partial denture. This function is performed usually by the occlusal or incisal resisters. At times, the function of the equalizers, or indirect retainers as they are known, is the chief function of the occlusal resisters.

The sixth part, the bars of the clasp, serves to attach the reciprocal and the active bearings to the occlusal resister or to the base of the partial denture. They may be tooth-borne or mucosa-borne.

The function of lateral resistance is needed in the majority of partial dentures. The tooth-borne bars of clasps are used as lateral resisters.

If possible, the tooth or teeth upon which the clasps are placed should be well-contoured teeth, free from large fillings. They should be supported by well-formed roots situated in healthy bone. Though the contour of the teeth may be satisfactory, the position of the tooth in the arch may increase or reduce its effectiveness as a retainer tooth. When extensive restorations are planned, it is wise to use more than one tooth. By the method of design to be described, it is simple to plan a clasp for one, two, three or more teeth.

In order to determine the axial relationship of the remaining natural teeth, one to another, a line of unit parallelism is established. This is done by the use of a mechanical surveying device. Opinions vary as to the position in which the cast should be placed in relation to the vertical or upright tool of the surveyor. Some operators relate the cast to the vertical tool of the surveyor in such a way that a definite method of placement of the partial denture is required in order that the bars of the clasp be not overstrained. The position that the cast occupies in relation to the vertical tool of the surveyor should be determined in a way that will permit a simple design. The fact that a partial denture of simple design is much more easily inserted and removed by the patient reduces the need for repairs.

The pencil mark which is transferred to the teeth on the cast by the vertical tool of the surveyor denotes that, at this position on the teeth, no interference would be met by an object moved upward and downward across this line. It should be kept in mind that this line does not denote the height of convexity of the teeth, since the position of the teeth in the arch and their contour and the manner in which the cast is related to the vertical tool of the surveyor determine the point at which the pencil mark will be made. As far as exerting a force of resistance to movement is concerned, this position on the teeth may be said to be neutral. I have devised a method to simplify the planning of partial dentures by utilizing this neutral position.

THE DUAL CIRCLE METHOD OF DESIGN

Since the survey line indicates a distinctive position on the teeth, this position suggests that the coronal portion of the tooth can be divided into three definite zones. The three zones are (1) the occlusal or incisal convergence zone, which extends from the neutral zone to and including the occlusal surface or incisal edge; (2) the neutral zone, which is established by the survey device, and (3) the gingival convergence zone, which extends from the neutral zone to the gingivae.

The name of the method is suggested by the line that is established upon the teeth by the surveying device. This line is formed into a circle that encloses the four axial surfaces of one or more teeth, as the case may be. This is the tooth circle. A second circle, the mucosa circle, is established on the mucosa immediately below the gingiva of the tooth, or teeth, upon which the tooth circle was established. Therefore, the method is known as the dual circle method of design. Portions of these two circles are utilized for the design of the clasp. Selection of the portions will depend on the function which they are to serve.

The zones of the teeth are used for a specific purpose. The occlusal or incisal convergence zone is used to prevent vertical displacement of the partial denture in a gingival direction. The occlusal rest or resister is placed in this zone and is used almost universally for this purpose. The neutral zone is used for the lateral resisters and the reciprocal bearings of the clasp. These parts should not be

placed in convergent (undercut) zones. The gingival convergence (undercut) zone is used to prevent displacement of the partial denture in an occlusal direction. The part of the clasp that is placed in this zone serves also to retain the other parts of the clasp in position.

The area that is included in the gingival convergence zone indicates that only the proximal surfaces should be used. Therefore, the active bearing is designed to occupy a position on the proximal surface of the tooth immediately below the tooth circle. The tooth-borne bars are designed to occupy a position on the buccal or lingual surfaces of the tooth on the neutral zone, since they, because of their length, are rigid. For this reason, the function of lateral resistance is fulfilled usually by the bars of tooth-borne bar clasps.

The second circle, which was established on the mucosa, is used for mucosa-borne bar clasps. When possible, active bearings are attached to mucosa-borne bars.

The several parts of the clasp, after they have been designed in their respective positions on these two circles, are connected with axial uprights in such a way that they will not retain an undue amount of food. More than one-half of the diameter of the tooth should be included in the dimension of the clasp. The terminal bearings should be planned to meet this requirement in order that the clasp shall not cause tooth movement.

After the parts of the clasp have been located properly and designed, they may be constructed from cast or wrought wire metal. If cast metal is used, it is essential for the wax pattern to be formed in such a way that the parts will function properly. The occlusal resisters must be of a gage to insure adequate strength. The position on the investment tooth where the active bearing will rest is relieved so that a slight pressure will be exerted upon the natural tooth at all times. The tooth-borne bars which serve as lateral resisters, and to which the reciprocal bearings are attached, should be of sufficient gage to insure rigidity.

The tooth-borne or mucosa-borne bars to which the active bearings are attached should be resilient. Therefore, they are of a smaller gage than the bars to which the reciprocal bearing is affixed. When the bars of the clasp are gaged in this manner, the partial denture will not be the cause of tooth movement. All parts of the clasp that are parallel to the occlusal surface of the tooth should converge toward the occlusal surface. This will prevent the retention of an undue amount of food.

Only two active retaining bearings are needed to prevent vertical displacement of the partial denture in an occlusal direction. When possible, they are located at the diagonal extremities of the partial denture. If natural teeth are present at the other two extremities of the partial denture, clasps are used, but not necessarily for retention. These clasps serve to hold the equalizers and lateral resisters in their proper positions and thus equalize the complex forces that are exerted upon the partial denture.

If wrought metal wire is used, the design is altered so that the several parts of the clasp can be constructed of the proper gage and shape of wire. Usually, the alteration is limited to the construction of the clasp in three parts. These parts are assembled during the process of vulcanizing or curing the base materials. To facilitate assembling, the three parts are held together by a small amount of solder. The solder is used at such a point that the strength of the wire will not be jeopardized by alteration of the formula.

Applegate,[2] Sayre[3] and others use a combination of cast and wrought metal. Since wrought metals have a greater life value and a higher elastic limit than cast metals, the use of wrought wire for the bar of the clasp of which the active bearing is a part is a distinct advantage.

In all cases wherein it is necessary to use a short bar of which the active bearing is a part, wrought wire should be used.

The actual design of the clasp, the relation of the clasps to each other and the type, the gage and the position of the lingual and palatal bars must be determined by a study of the biologic and mechanical peculiarities of each case. The careful selection and manipulation of the materials that are used for the fabrication of the partial denture are equally important.

The carefully planned partial dentures may fail because the materials that are used in their construction were not selected for the desirability of their physical properties or were used in a manner to destroy these properties.

CONCLUSIONS

Partial dentures of the simple type can be expected to render services as satisfactory as those that are rendered by other restorative procedures used in dentistry, provided the dentist considers partial denture service as a health service. Dental treatments must be adequate. However, in every instance, they should be simplified so that satisfactory service may be brought to a more satisfactory economic level.

It is hoped that this method of design will suggest to dentists ways in which they can increase the number of partial dentures constructed in their offices, that the cost of partial denture service to the public may be decreased.

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GAUCHER'S DISEASE: REPORT OF A CASE

By G. C. TASSMAN, D.D.S., and I. B. BENDER, D.D.S., Philadelphia, Pa.

IN a previous communication,[1] dental roentgenographic signs of Gaucher's disease (familial splenic anemia) were reported. Since then, we have had the occasion to observe another instance of Gaucher's disease which substantiates our original findings.

REPORT OF CASE

A. D., a boy, aged 12, was admitted to the hospital with a diagnosis of Gaucher's disease. A splenectomy was then advised because of the tremendously enlarged spleen. Laboratory and x-ray findings confirmed the provisional diagnosis.

From the Dental Department of the Jewish Hospital.

Examination of the mouth revealed an extremely pale mucous membrane. The gingivae were firm and markedly anemic. A slight proliferation of the gum tissue noted around the upper central incisor teeth was probably due to incomplete eruption. No exudate could be elicited on pressure around any of the gums. At no time during the stay in the hospital was any bleeding or petechial spots noted in the mouth. The hard and soft palate and the floor of the mouth were entirely negative. The saliva was thin, watery and clear and not excessive. The teeth were well filled and non-carious. The upper left permanent lateral incisor was slightly discolored and did not respond to the pulp tester.

X-ray examination revealed a pseudocystic appearance of the mandible in the

molar and premolar region. (Fig. 1.) The unerupted premolars were noted directly under the deciduous molars. There was an area of radiolucency in the mental region. The maxillary premolar areas were not clearly shown and seemed to be obscured by the unerupted permanent teeth, thus overshadowing the cancellous structure. The region of the upper right lateral incisor showed porosity of bone. This is not to be confused as an area of infection around a non-vital tooth, but is the result of a generalized bone disturbance.

COMMENT

Gaucher's disease was first described as "Epithelioma de la rate" by Gaucher[2] in 1882. This disease is one of a group usually described under the general heading of xanthomatoses. Belonging to this group are the following: Gaucher's disease, Niemann-Pick disease (lipoid histiocytosis), Schuller-Christian's syndrome, Tay-Sach's disease (amaurotic family idiocy) and xanthomatoses of the skin. That each one of these diseases is due to a disturbance of lipoid or fat metabolism has been shown by Epstein and Lorenz.[3] Leib[4] identified the lipoid at fault in Gaucher's disease, one of the cerebrosids, and called it kerasin. According to Pick,[5] kerasin is stored in foam cells of the reticulo-endothelial system, especially in those of the spleen and liver. These foam cells, which usually measure from 20 to 100 microns in diameter, are known as Gaucher cells. In Gaucher's disease, the foam cells invade the spleen, liver, lymph nodes and bone marrow.

Gaucher's disease is usually most prevalent in the Jewish race. It appears to be more frequent in the female. Clinically, it is characterized by a slow chronic course with a gradual increase in the size of the spleen followed by an enlargement of the liver, the superficial lymph nodes remaining normal in size. The patient develops certain blood changes. First, there is a leukopenia, then a hypochromic anemia. A thrombocytopenia is present which is related to the hemorrhagic diatheses characterizing the late stages of the disease. An inconstant symptom, described by many authors, is a yellow wedge-shaped pinguecula of the sclera and conjunctiva.

According to Pick, the bones appear to be less opaque because of generalized atrophy and calcium deficiency, and coarse-grained and worm-eaten because

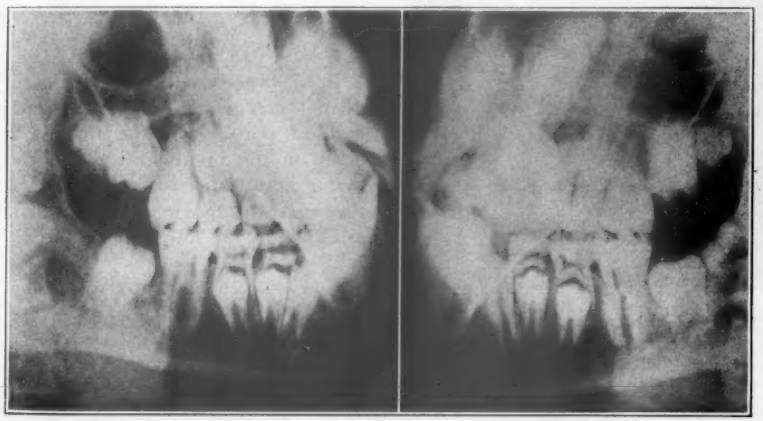

Fig. 1.—Right and left sides of mandible showing loss of trabecular structure in premolar area. There is some evidence of thinning of the cortex.

of the extreme porosity. The cancellous bone may show large defects together with thinning of the cortex. Collapse and deformity of the head of the femur are visible in the x-ray film. There is often a clublike appearance of the lower femur and (Fig. 2) apparently a reduplicated cortex. The intervertebral disks appear unchanged. There are no reactive or regenerative processes in the bone and periosteum and the cartilage is always intact.

Fig. 2.—Clublike appearance of femur; extensive vacuolization of medulla due to Gaucher cell infiltration.

tions occur on both sides and are uniform in rarefaction.

Bleeding of the gums and of the nose, which is characteristic of the late stages of the disease, is not due to Gaucher's disease proper. It is merely an expression of an associated thrombocytopenia. When hemorrhagic phenomena are absent, extraction of teeth or other oral surgical procedures may be performed.

As Gaucher's disease is extremely chronic in its course, bone lesions may be present even before splenic or liver enlargement is manifested. It may be possible at times to detect the disease in its early stages by means of the roentgen-rays.

SUMMARY

In a case of Gaucher's disease, the dental roentgenographic signs were generalized porosity of the maxilla, especially in the premolar area; a pseudocystic appearance of the mandible in premolar and molar areas, and demineralization in the lower incisor area.

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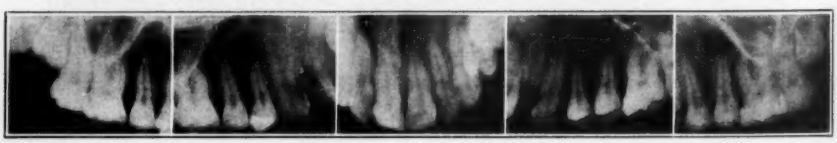

Fig. 3.—Marked demineralization in premolar areas. (Clinical photography by Morris D. Skarupsky.)

The dental x-ray examination in Gaucher's disease reveals a generalized porosity, with areas of radiolucence that are pseudocystic in appearance in the mandible and areas of lysis in the maxillary region. (Fig. 3.) A differential point to consider is that radiolucent zones present in the mandible under normal condi-

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THE AMERICAN BOARD OF ORTHODONTICS

By H. E. Kelsey,* D.D.S., Baltimore, Md.

WHATEVER credit is due for inaugurating and continuing the movement that eventually resulted in the formation of the American Board of Orthodontics belongs to the late Albert H. Ketcham. Quite probably it would have died out, as ideas of a similar nature had done previously, without his untiring devotion to the standards and ideals which the project embodies. The first board of this kind was the American Board of Otolaryngology, and Dr. Ketcham wisely sought their aid and experience in organizing the orthodontic board. At that time, the American Board of Otolaryngology rendered valuable assistance, as it has on several occasions since. The time and labor given to the organization of the orthodontic board were considerable, but were lessened by patterning it after the otolaryngologic board, which had attained a high state of efficiency as the result of experience, during which errors could be corrected and methods of sound administrative procedure be proved and adopted.

At this time, when a number of the other dental specialties are organizing or contemplate organizing similar boards, it may be of interest to the profession to learn something more of the workings of the American Board of Orthodontics, which has been in successful operation for more than ten years. After all, the profession as a whole and the laity generally are equally benefited by the operation of such boards if properly conducted and their activities brought to the attention of all members of the profession in a suitable manner.

It has come to our attention, on several occasions, however, that a large percentage of the dental profession are not aware of the existence of the board, although most of the members of the profession are aware of the fact that orthodontics has existed as a specialty for many years, well organized and with national as well as regional societies which, we believe, have had a stimulating effect upon the specialty and the profession as a whole. One of the functions of the board is to provide a means whereby the general practitioner, when referring cases for treatment, can distinguish between those men who have and those who have not prepared themselves by study, and by close application to the principles underlying orthodontic treatment, to give service which will measure up to the highest accepted standards of the specialty. The board does not, however, assume that only men who have been certified are capable of giving this service. Some of the best orthodontists have not applied for certificates and may never do so. Some do not apply because they do not care to give the time and effort to preparing the material for a test, which they could undoubtedly pass successfully. Others (as in all vocations) are not sufficiently interested in their work to exert themselves to give the highest type of service and therefore could not meet the requirements of the board. It is because of such conditions that certifying boards were established.

In referring cases locally, dentists in general practice may be able to select perfectly competent men in their own neighborhood who might or might not hold the certificate of the board, but in

*President, American Board of Orthodontics.

referring patients to orthodontists in other parts of the country they can do so much more intelligently by availing themselves of the information which is provided in the list of specialists who have been certified. What is true of the orthodontic board will of course be true of all other boards, and the work of the individual board can be improved and stimulated by collaboration with other boards through a general advisory board.

A movement to establish, under the patronage of the American Dental Association, a general advisory board the members of which would be representatives of specialty certifying boards already in operation, or to be organized in the future, was successfully inaugurated a few years ago, though, at the time, there was but one board (that of orthodontics) in operation. Two or three other boards, however, were in process of organization and have since been successfully launched. Such an advisory board can be of great benefit, as has been proved by the establishment several years ago by the medical profession of one composed of representatives of certifying boards of the various medical specialties. The American Board of Orthodontics welcomes the opportunity to cooperate in a similar constructive movement. In medicine, the number of certifying boards of the various specialties has been greatly increased during the last few years, and many hospitals today limit their staff appointments to those who have been certified by these boards.

To explain the working of the American Board of Orthodontics, which has now reached a rather mature development, I quote from a short paper presented before the New York Society of Orthodontists last November:

> In the beginning, a number of men who were outstanding contributors to orthodontic literature and were nationally known for their excellence in operative procedure, and who had been in practice for fifteen years or more, were certified on their record. This was in line with a classification adopted and still in effect, and those men who were certified on their records, or eligible to be so certified, comprise class one. Those who have been in practice ten to fifteen years comprise class two. Those who have been in practice from five to ten years comprise class three. It must not be supposed that the Board has ever made a habit of certifying men who have been in practice fifteen years or more simply because of that one qualification. Such a man, who had not contributed to the literature or to society programs; who had, in other words, given no evidence of proficiency by which he could be judged, might be asked for as much material in the way of theses and case reports as would be asked of other men who had been in practice from only five to ten years. As a rule, men who have been in practice from ten to fifteen years are not asked to present as much material as are those who have been in practice from five to ten years only. Thus it will be seen that a man's record of accomplishment, his interest in his work and in his professional organizations, and his general record for high ethical conduct all have a bearing upon the question of requirements. The board welcomes applications from men who are sufficiently interested in what the certificate stands for to be willing to take the time and trouble to make a good presentation.[1]

While there are still men whose extensive and genuinely valuable contributions to the profession in the field of research and practice entitle them to certification on their record alone, there will naturally not be nearly so many certificates issued in this manner in the future as in the past.

The board has been in operation now for a good many years and we believe that its most important function has been to stimulate the younger men to take a true interest in the advancement of the profession and, of course, concurrently in their own advancement; all with the object of making it possible to give better service to the public. If all

1. KELSEY, H. E.: *Am. J. Orthodontics*, 26:57, January 1940.

recruits to the profession wait until they have been in practice fifteen years before making application, much of the benefit just referred to would be lost, and unless their contributions by that time were sufficiently notable to entitle them to certification on their records, they would not be likely thereafter to adopt habits of study and practice which would improve them sufficiently to meet the standards of their day. It is a fact that of the men who apply for certification, a very large percentage are among the outstanding practitioners in their communities, and this has been a matter of much satisfaction to the board.

There are more than 600 orthodontists in this country and abroad, and up to the present time 178 have been certified after satisfactorily complying with the requirements of the board by giving evidence of high standards of practice and ethical conduct toward their patients and also toward other members of the profession and by submitting acceptable case reports and theses on subjects suggested by the board. The board is fully aware that there are many others who are quite competent to meet its requirements as they have been built up during the more than ten years of its existence, and the applications of such men are always welcomed by the board. One of the most important phases of application is the securing of adequate endorsement. The board cannot possibly have knowledge as to the fitness of all applicants and would not wish to take the responsibility of endorsing applications even in cases where they might be well assured through intimate personal acquaintance that the applicants possess the high ethical, moral, and professional qualifications which are, of course, fundamental "requisites" in any application. Nor does the board feel that the endorsement of an applicant by some friend or friends, however outstanding, in a section remote from the applicant's own address, would be acceptable without equally adequate endorsement by confrères in his own location.

During the first few years, quite a good many applications were received and accepted, after which the applicant for one reason or another failed to prepare and present the material desired by the board (in the way of theses and case reports) at its following meeting, nor indeed thereafter in some instances for three or four years. During the last two or three years, to obviate any unfairness, the board has granted extensions in many cases so as not to work a hardship or be unfair to anyone who might not have been fully acquainted with its working details. The board now feels that applications should be followed up by meeting its requirements within three years, failing which, the board will feel justified in requiring a new application.

A comment based upon our ten years of experience might be useful to those who contemplate applying for certification. We have found that, as a rule, presentations made by applicants indicate that they have a good comprehension of the objectives which underlie the test for certification, but some do not. It is conceded that all are not equally qualified to present theses which adequately delineate the processes of reasoning from which their deductions are drawn, but it is considered important and desirable that they at least be able to express themselves with clarity and accuracy when presenting the results of their thinking or research. Many have indulged in wide reading for the purpose of preparing theses, and most are able to assemble the thoughts and expressions of others on a given topic and present them in conjunction with their own conclusions in an acceptable manner and in their own language.

Occasionally, however, a thesis will be simply a potpourri of other men's published opinions which resemble the reports of some of the frequent questionnaires which are sent out. Some of these men are excellent orthodontists, who have a high percentage of success in their work, but find it difficult to prepare a good thesis, largely owing to the fact that they have no sustained habits of reading or study. Many of them have later contributed matter of real value to the profession, which they would not have done had they not

been stimulated to a really conscientious effort by their desire for certification, which implies a desire to improve the quality of their service and to be regarded as belonging to that group who are looked upon as leaders of the profession truly equipped to give the best service to their patients. They thus become a credit to their profession, to the board and to themselves.

Dr. Ketcham felt strongly that a man desiring certification should present material in a creditable manner and that he should maintain a creditable office in which adequate records would be kept according to modern standards. He firmly believed that most men who desired certification could, by diligent application, prepare themselves for it even though they had neglected to maintain habits of reading and study after finishing college and possibly other special courses.

The board has noted with much satisfaction the growing appreciation of the apparent value of its work and desires to thank the various orthodontic societies and the profession at large for the increasingly cordial support which is being given to it.

833 Park Avenue.

A NEW AND COMPLETE TREATMENT OF PERIODONTOCLASIA

By WILLIAM BROWN INGERSOLL,* D.D.S., Washington, D. C.

EXISTING methods of treatment of periodontoclasia[1] frequently fail to reflect the point of view of the profession relative to oral disease. The varying degrees of success of the past have resulted from technics ranging from the conservative method of instrumentation to the various customary methods of diet adjustment and x-ray and wave therapies, down to the scores of related therapeutic preparations. In the past, the etiology and the treatment of periodontoclasia have been predicated on wide diversities of opinion. Why these diversities and why their resulting varying technics? There has been only one goal in common: a healthy mouth with firm teeth, and normal gingivae.

Probably the chief reason for lack of uniformity of opinions and methods is the paucity of fundamental knowledge possessed by the originators of the various pathologic pictures; also, a restricted sense of balance and proportion preventing a realization as to where each theory and procedure applies and wherein it is deficient. Many of these men expanded only on their successes, but minimized cases in which their therapeutic method failed. With the possible exception of operative dentistry (covering caries), there exist more determined riders of hobby horses in the specialty of periodontia than in any other branch of dentistry.

The method that I pursue in the treatment of diseased periodontal areas and in the eradication of pockets is the excision of all diseased granulation tissues. These tissues form in the region where tissue structures normally existed for the

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1. The common term "pyorrhea," which refers specifically to pus flow, is only one phase of the broader term "periodontoclasia."

Fig. 1.—Normal tooth section of lower cuspid; showing consistency of bone in alveolar process and healthy gingivae overlying process.

Fig. 2.—Hypertrophy of marginal gingivae. Lack of stimulation and delay in restoring upper dentition were the cause of the condition.

protection of the underlying bone. Subsequently, Nature will perform its duty by restoring healthy tissue. This biologic action will in turn set up healthy osteoblastic activity within the bone.

Fig. 3.—Abnormal tooth section of lower cuspid; showing formation of tartar on labial surface, thickening of cementum over apical area and necrotic bone (A).

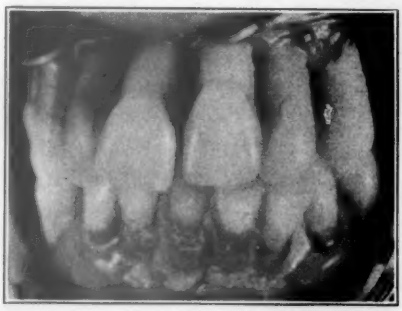

Fig. 4.—Typical example of lack of coordination, which should have been established years before. Twenty-eight good teeth were extracted.

PERIODONTOCLASIA DEFINED

Periodontoclasia is a chronic, nonspecific, expanding disease of the alveolar process, causing dissolution of the osseous elements. Its clinical manifestations, primarily local but later generalized into systemic disturbances, consist for the most part of tenderness, irritation and bleed-

ing of the gums, with consequent loosening of the teeth, with a marked tendency to malposition and ultimate loss. The disease, when once established, stubbornly resists most remedial measures. So-called pyorrhea is one of the oldest diseases described by historians or mentioned by antiquarians. Loss of teeth, with alveolar destruction everywhere, is found commonly in the skeletal remains of the ancients. Even today, it is regarded as an unavoidable calamity for youth and is accepted as inevitable for old age.

Fig. 5.—Example of one typical case, establishing author's theory.

Fig. 6.—Case shown in Figure 5, three months later. The upper denture is in centric relation, the lower teeth having been treated as outlined.

URIC ACID THEORY

At the inception of the uric acid diathesis, many theories of far-reaching significance were attached thereto. So varied and complicated were these theories that it became difficult to name a single oral condition that was not ascribed to the presence of uric acid. There is little reason to doubt that the accumulation of uric acid within the system is detrimental to the natural forces. Also, careful study may prove that its existence promotes the disease processes. The paramount effects of uric acid within the body relate to circulatory changes. Its action on the vasomotor system constricts the arterioles, with increased peripheral resistance. The consequent increase in blood pressure and diminishing of the blood supply to the region result in

Fig. 7.—Protrusive relationship. Every tooth must be stimulated by the upper denture in eccentric movements.

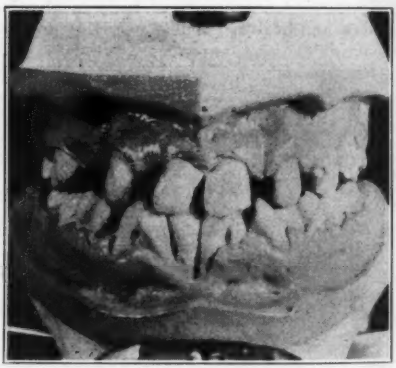

Fig. 8.—Models of natural dentition in centric relationship mounted on articulator.

atrophy and the deposit there of uric salts; and a lesion is produced in this area. Fundamentally, this is the basic uric acid hypothesis. It explains the origin of certain diseases whose specific etiology is still obscure. It fails, however, as a guide when the exact condition or disease arises in the absence of uric acid. The presence of uric acid is frequently looked upon as a factor in disease. This is the exact relation that the uric acid bears to periodontoclasia. When the acid is present, it undoubtedly accentuates the disease; but confirmation of its presence in only a relatively small number of cases does not establish it as a cause of periodontoclasia.

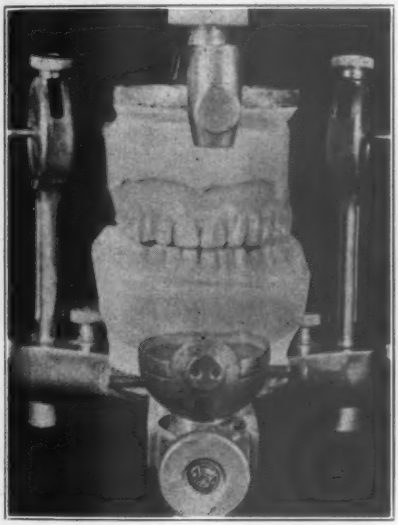

Fig. 9.—Models of artificial denture and natural lower dentition in centric relationship mounted on articulator.

BACTERIOLOGIC THEORY

Findings relative to a specific germ are valueless. Successive investigators have announced the discovery of new organisms, each claiming identification of the specific pathogen. Conflicting claims suggest that the organism engaged in the process is still undetermined. It may be that such a germ does not exist. The isolation of a specific organism is not imperative for the diagnosis of periodontoclasia. Neither clinical pictures of the disease nor laboratory findings indicate the probability of a specific germ. Study of the disease reveals no specific origin, and its lesions are neither typical nor characteristic. Its initiation lies easily within the power of those pathogens that are habitually associated with the disease. Indeed, the discovery of a specific germ may be redundant.

The bacteriology of periodontoclasia is the bacteriology of the mouth—complicated and varying, with but little reliable information available. In each case that I have studied bacteriologically, there existed no fewer than two of the well-known pathogens. Frequently, there were more. In addition, there were present many of the non-pathogenic organisms, together with hordes of saprophytes. Each of these classes of organisms, together with their various subclasses and subdivisions, originated in the mouth. It is, of course, not difficult to see how this was possible. The mouth is the most common and constant avenue through which the different areas of the general system become infected. Few indeed are the particles of food taken into the body which do not bear contaminating organisms.

Fig. 10.—Models of natural dentition in eccentric relationship mounted on articulator.

My bacteriologic research in cases of widely divergent pattern has clearly established the frequency with which certain organisms are identified with different types of periodontoclasia.

OCCLUSION THEORY

One of the most important contributions to a knowledge of the etiology of dental periclasia is the occlusal relationship. Merritt calls attention to an article on this subject by Quedenfeldt in 1908, and emphasizes that little attention was paid to his teachings at that time. Stillman, in 1917, pointed out the possibility

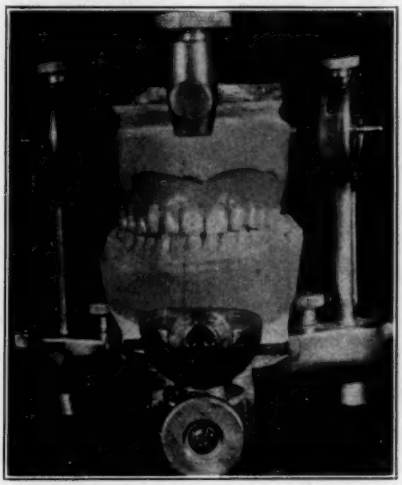

Fig. 11.—Models of artificial denture and natural lower dentition in eccentric relationship mounted on articulator.

of damage to supporting tissues through inharmonious inclined-plane relationships and attendant excessive strain. The damage, he declared, came not so much from stress delivered at normal angles to the long axis of the tooth, as from force exerted in abnormal directions upon the peridental membrane and alveolar bone. Clinical results of carefully considered treatment justify the belief held by many operators that force is often an important etiologic factor. For example, the balancing of stress in the region of the incisors often prevents destruction of the alveolar support, and the grinding of these teeth is justified even though no beginning pathosis is manifest. On the other hand, there are those who suggest that traumatic occlusion is frequently the result of certain types of dental periclasia. (Box, of Toronto, has, in numerous articles, pointed out the effects of excessive stresses on the peridental membrane and the alveolar process. In the condition that he calls "rarefying pericementitis fibrosa" he attributes the characteristic changes to stress, supporting his contention by pointing out that the changes begin in those areas subjected to the severest strain.)

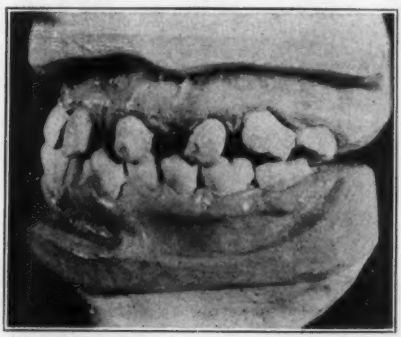

Fig. 12.—Models of natural dentition in centric relationship of left side.

It is not possible to make reference to the numerous articles for and against the theory of traumatic occlusion. However, the author who probably has most effectively minimized its importance and effect is H. W. MacMillan, who maintains that the periodontal tissues are so formed and adjusted that they withstand all stresses of mastication without injury. Articles supporting the theory have been written by J. O. McCall, Austin F. James, Sidney Sorrin and many others.

NUTRITION THEORY

One of the most discussed subjects in

relation to etiology of dental periclasia is that of nutrition. Dentists became tremendously interested in the subject of diet in the years following 1918. Percy R. Howe's research in dental caries yielded much valuable information regarding the effect of dietary deficiencies on the condition of those tissues that support the teeth. He has demonstrated that changes in the alveolar bone of experimental animals may be produced at will by diets deficient in various essential elements. His scurvy-producing diets caused rapid resorption of the alveolar support in guinea-pigs and rats. We have in our possession specimens in which the inferior borders of the mandibles are completely honeycombed after three weeks on this diet. Howe has also demonstrated the possibility of affecting tissues at any time during the progress of this resorptive process to the point where they will undergo repair on the addition of calcium and phosphorus to the diet.

Metabolism is interfered with in diets deficient in vitamin C, and even though food is adequate as to minerals, absorption and utilization of these elements are prevented. Also, the factor of absorption of toxic products from the inactive bowel is pertinent. One is prompted to suggest the importance of this factor in many of the pathologic conditions found in the mouth. Is it not possible that the burden of elimination of toxins thrown upon the system may affect the whole calcium balance in the blood?

Vines has stated that toxins are eliminated when combined with the ionic calcium of the blood. It is my contention that if this is true, the mineral level in the blood is thus lowered, with a resultant call upon the storehouse (bones) for replenishment, and obviously a lowered resistance of the alveolar bone and tissues. With this removal of lime salts, and with capillary engorgement, there is the systemic disturbance with its reflection in the local resistance of the alveolar tissues.

Fig. 13.—Models of artificial denture in centric relationship of left side with lower natural teeth.

BIOLOGIC THEORY

Dentists are not as a rule accustomed to consider and apply the principles of cell life. In our treatment of periodontal abnormalities, for example, we are inclined to begin a diagnosis with tissue injury as a basis. Normal cell life represents a condition of balanced metabolism. This means that every cell is receiving the proper amount of nourishment for its maintenance and is excreting any in-

fected type of organism present, thereby performing its rôle in maintaining good health.

Treatment of diseased periodontal areas does not require that attention be specifically focused on tissue disturbance. I cannot emphasize too definitely the importance to each of us of an intimate knowledge of the processes of normal cell life. It is only by a study of these phenomena that appreciation is had of the coordination that exists between individual cells of the cell protoplasm. Duty demands that we possess not only this knowledge, but also that which concerns a disturbance of this coordination.

Fig. 14.—Right side of natural dentition. The lower second bicuspid and the first molar were exfoliated from lack of occlusal force.

It is in an effort to give appropriate recognition to these past contributions, as outlined above, that I have studied the problems of periodontoclasia. Because I believe that each of these theories needs to be reduced to specific technics, I have developed one complete and specific treatment for certain types of cases.

COORDINATION THEORY

I have reduced to practical use the broad theories of Stillman, McCall and many others relative to occlusion by coordinating these theories with the surgical theories of such leaders as Ward and Kirkland. Let me emphasize again that I am referring to the broad subject of periodontoclasia and not to the restricted, yet common, subject of pyorrhea. My theory, in selected cases, involves: 1. Removal of all upper teeth if the future of such teeth is questionable. 2. Treatment of the lower teeth by excision of infected tissue areas. 3. Balancing of the bite relationship. The force of occlusion in such integration results in greater biologic cell activity in the remaining structures of the oral cavity. This process may seem a step even toward the radical, but let me reiterate that this action is specifically for carefully selected cases. The treatment is not a complicated one, but is one which the medical profession might well expect us to encompass. By merely taking advantage of the current training available in the biologic sciences and the practical demonstrations of technic, this can be acquired by all who will give it time and consideration.

Actual photographs of a few cases which have been worked out in our laboratories are presented, portraying histologic and pathologic sections; and also the bacteriologic phase of the theory outlined above. These present a studied scientific approach to the theory advanced.

In closing, let me again emphasize that the theory presented is applicable to a specific type of treatment for certain cases. It is hoped that others will carry forward research which will result in a number of other specific modes of treatment.

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EVIDENCE OF THE HEREDITY FACTOR IN OPALESCENT DENTIN

By Don C. Lyons, D.D.S., M.S., Ph.D., Jackson, Mich.

EVIDENCE has been gradually accumulating as to the importance and existence of the heredity factor in the dental anomaly opalescent dentin. Finn, in 1938,[1] in reviewing the literature on anomalies of tooth color, quoted the reports of twenty-four investigators of this condition. His careful study of opalescent and brown hypoplastic dentin has done away with the previous confusion as regards the differentiation. Hodge *et al.*[2] more recently gave the complete medical and family histories in a number of cases.

The following cases (Figs. 1 and 2) in one family group illustrate a number of important factors in opalescent dentin and confirm many previous observations and theories.

The two patients were brother and sister, aged 29 and 27, respectively. A study of the genealogy of the family (to be called "D" in this case) reveals some pertinent facts regarding opalescent dentin. It was reported by the patients that the great grandmother, who had died only a few years previously, had brownish teeth similar to theirs. It is therefore assumed that she had opalescent dentin.

The accompanying table, giving a complete family genealogy as far as it was possible to determine, shows that opalescent dentin was a dominant characteristic in this family, but heterozygous; confirming a trait reported by other observers. It will be noted that of the twenty persons in the "D" family with opalescent dentin, fourteen were female and six male. In family D^2, originating from the female side of the family, the opalescent dentin passed to the male side of the family and to only two of seven children. In family D^3, of female origin, two of the three daugh-

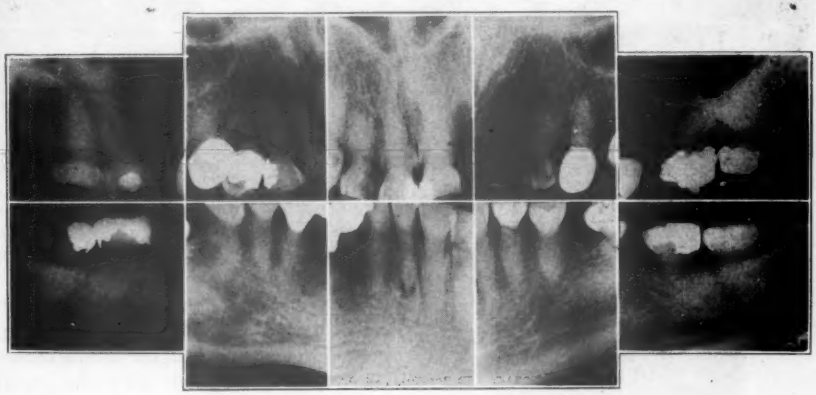


Fig. 1 (Case M.D.).—Opalescent dentin in woman aged 27 (family No. 6).

ters inherited the opalescent dentin characteristic. In family D^4, originating from a daughter with normal teeth, all twelve children had normal teeth. Family D^5, of female origin, had seven children, two daughters and one son inheriting the anomaly. Family D^6, of female origin, with six children, passed the trait on to a son and two daughters. Family D^7, originating from the male side, with opalescent dentin, had seven children, the characteristic dentin passing to three daughters but to none of the four sons. Family D^8, originating from the male side with normal dentin, had four children, two sons and two daughters, all with normal teeth. Family D^9, originating from the female side (opalescent dentin), had one child, a daughter, with this anomaly. Family D^{10}, originating from the female side with opalescent dentin, had four children. Two sons and the daughter had opalescent dentin. The fourth child was a baby too young to furnish a history.

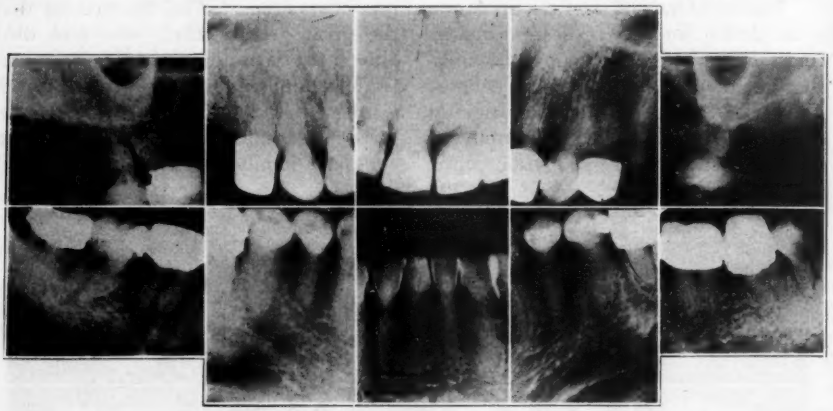


Fig. 2 (Case G.D.).—Opalescent dentin in man aged 29 (family No. 6).

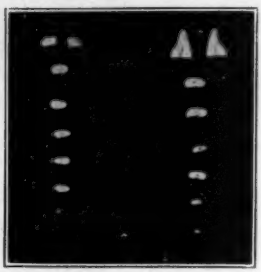
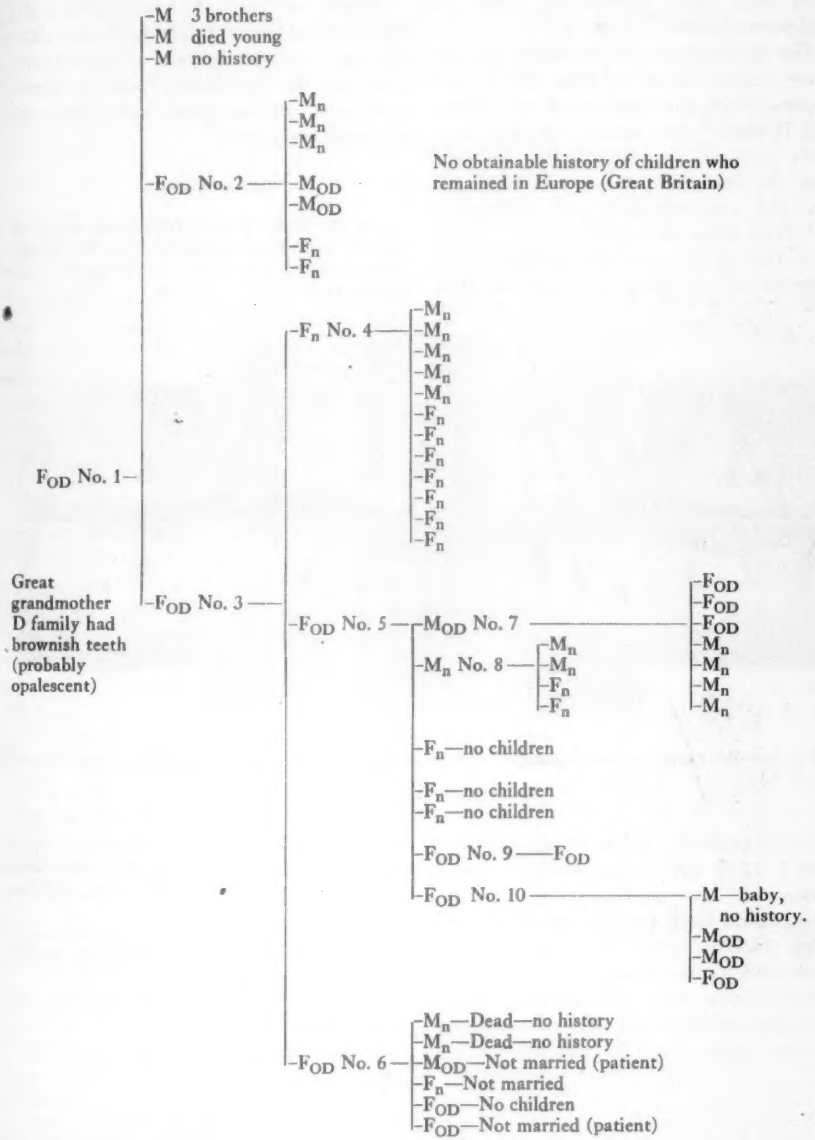


Fig. 3 (Case M. D.).—Left: Cross-section of lower incisor, showing closure of pulp canals with exception of apical two sections. Right: Cross-section of normal lower central incisor, showing normal pulp canal.

The predominance of opalescent dentin in the female side in this family suggests some sex dominant characteristic. This fact corresponds with the reports of other investigators in this field.

The two cases reported here correspond in many ways with previously described cases of opalescent dentin. The tooth roots were short, blunt, scant and cone-shaped. They were grayish brown in both cases. As illustrated in Figure 3, cross-sectioning shows that most of the brown coloration was confined to the dentin, with the enamel of a peculiar translucence. The root canals were almost completely obliterated. Roentgenographically, they appear to be totally absent in all teeth in Case M.D. (Fig. 1) and in the majority of those in Case G.D. (Fig. 2), but a cross-section of the lower right central incisor shows a very

D FAMILY GENEALOGY



small canal in the apical two sections. In Case G.D., there is x-ray evidence of some small root canals in several of the molars and the cuspid teeth. Figure 4, presented for comparison with these two cases, illustrates graphically the differ-

ence between the pulp canals of normal teeth and those present in cases of opalescent dentin.

The development of an abscess on the lower central incisor of Case M.D. corresponds with the observation of Wilson and Hodge[3, 4] that apical abscesses may form without apparent cause. In this case, the tooth in question was non-carious and non-pyorrheic and without a history of injury or trauma.

Neither of the cases corresponds to the observations of other investigators that there is generally a low caries susceptibility. They agree with Hodge's observation of low sensitivity to thermal change and both patients reported that large carious areas developed in the teeth without the slightest sensitivity to or irritation from heat, cold or sweets; which probably accounts for the extensive restorative work noted in both cases.

SUMMARY

These cases, with the family genealogy, demonstrate the fact that opalescent dentin has certain definite characteristics and that the hereditary factor is dominant and heterozygous and does not maintain a sex trait.

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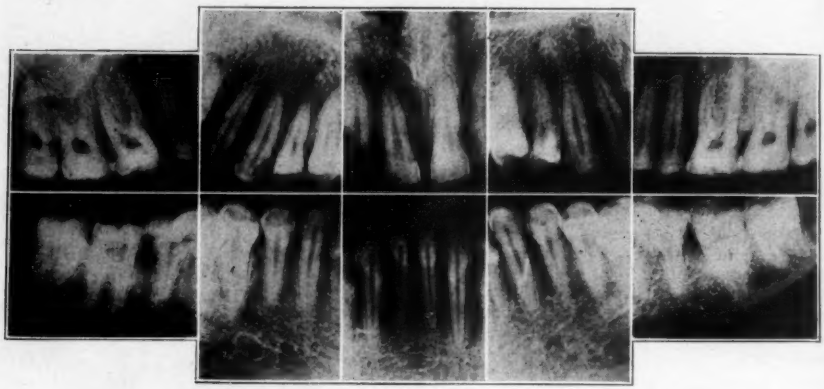

Fig. 4.—Roentgenograms of normal teeth with normal pulp canals. (Compare with Figures 1 and 2.)

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VASCULAR SPASM AND BACTERIAL LOCALIZATION

By A. J. Nedzel, M.D., Chicago, Ill.

WE commonly think that the presence of pathogenic micro-organisms in the body is sufficient for infection; we still are greatly concerned over the appearance of bacteria in the blood stream, but some authors, such as Keith and Squier[1] and, recently, Elliot,[2] point out that bacteriemia does not necessarily mean the initiation of an infection; that apparently healthy persons at times have a bacteriemia without any ill-consequences. After tonsillectomies, showers of micro-organisms pour into the blood stream (Elliot[2]), just as they do after tooth extractions, especially with the preliminary "rocking" of the tooth with forceps, and yet only a few complications, in the sense of postoperative infections, arise after such operative intervention.

The old theory regarding *locus minoris resistentiae* is well-substantiated at present by clinical as well as by experimental evidence. Burrows[3] assembled a mass of proof pointing to the localization of any particulate matter (including micro-organisms) from the blood stream in injured tissue. For effective localization in tissue of bacteria from the blood stream, he demonstrated that there must first be a change in the status of the tissue in the particular region. Most commonly, this change is associated with an injury or inflammation of this tissue. Since we know that inflammation follows an injury, we come back again to an injury as the primary cause of the change in local status.

We are not here interested in discussing the common injury of physical, chemical or any other source. It is obvious and comprehensible. The injuries of interest to us are those that are not detected by present methods of observation and study, but are evidenced by intangible alterations that, seemingly spontaneous, are caused by some functional change in the body. To understand them, some knowledge of physicochemical events is required, because we are here dealing with physiologic processes presumably occurring in the body at various times.

The endothelial wall of a capillary regulates the food supply to the cell, controls the removal of the waste products and protects the cells from an invasion of any foreign matter (bacteria, toxins, etc.) that happens to be in the blood stream. In view of all these basic functions of the capillary wall, the permeability of the capillary endothelium is the most important factor in the well-being of the cells that compose the tissues and organs.

Oxygen plays the largest rôle in the metabolism of the cell. With any diminution of the supply, there can be no normal function. For this reason, the phenomena of anoxia and the anoxemic state become more and more prominent

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Read before the Section on Histology, Physiology, Pathology, Bacteriology and Chemistry (Research) at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

in studies of pathologic conditions of the human body, as well as in therapy.

The degree of permeability of the endothelium of the capillary wall regulates the direct penetration of different substances, soluble as well as particulate, such as bacteria. When we are concerned with particulate matter, it is not a matter of osmosis. Here, we deal with a change in the endothelial function that is in part physical and may in turn depend on bio-electrical phenomena and a change in adhesiveness. In anoxia, as also in trauma or inflammation, this change in permeability for particulate matter appears as a result of an increased demand on capillary activity; but it is a demand, and a response to the demand, which oversteps the normal bounds.

The capillaries, in accordance with the demand for nutrition and the accumulation of waste material (metabolites) from the cells, contract and dilate continuously. This function, which is performed harmoniously, depends on the stability of the autonomic control of the vascular system and its ability to meet a reasonable demand on the body in adjusting itself to a change in environment, particularly to temperature change, to work and rest, to emotional situations and the associated endocrine alterations, etc.

In the case of an unusual change in the meteorologic environment, either because of suddenness or undue prolongation of taxing situations, especially in persons who have an unstable autonomic system (and such persons are usually either very slender or heavy), the capillaries cannot adjust themselves quickly enough, and the normal balance between vascular supply and tissue demand is disturbed. With the onset of a cold wave, which is nearly always accompanied by an increase in barometric pressure, groups of capillaries contract for a considerable time in various vascular beds, chiefly the peripheral, with a resultant diminution of oxygen supply to groups of cells or to organs. We then have a definitely localized or more wide-spread anoxia of the tissues. This phase of contraction or spasm (the ARS phase of Petersen)[4] is in turn followed by a restorative phase, when dilatation occurs (COD phase); and this may then, as a compensatory mechanism, also be of an exaggerated type.

Periods of prolonged spasm are followed by stimulation, fatigue or anoxemic injury to the cell or group of cells, and with this there is a lowering of natural resistance to traumatic agents such as bacteria, toxins and intermediary products of metabolism. During the phase of dilatation, when the tissues become hydrated, the cohesion is somewhat lessened and the endothelium becomes more permeable (Landis[5]), the penetration of particulate matter is increased.

When we observe the function of the skin capillaries with a skin microscope, it will be noted that some of the capillaries close, while the others open; then the latter will close and the former will open; etc. This interchange in the functional state of these blood vessels will go on continuously, as long as the atmospheric environment remains virtually unchanged; but when the human skin meets with cold, as a result of either atmospheric change or direct application of cold to the area, a considerable number of arterioles and capillaries will first close. There follows a compensatory change, when we find a large number of opened capillaries and relative stasis. In this limited area, we have the illustration of changes that are constantly going on in remote capillary beds over larger areas.

As a result of these considerations, the ARS phase, or what might be termed the pressor episode, because general diastolic and systolic blood pressures are increased, the pressor crisis (*Pal* crisis), the so-called *Hochspannungskriese* of the Germans or the alarm reaction of Selye,

really represents a period of relative sympathicotonia associated with the release of pituitary and adrenal constrictor substances. Coincidentally, there is usually an increase in the blood pH and a decrease in the carbon dioxide content.

Then follows the corrective phase, initiated by the accumulation of acids produced by anoxia, by capillary active substances, by an increase in thyroid secretion, etc. This constant pendulation of pressor crests with corrective phases of vascular dilatation is commonly initiated by changes in the atmospheric circulation in our latitude, but, needless to state, a multitude of intercurrent events (psychic phenomena, physical activity, trauma, etc.) may bring about similar though usually transient episodes of this character.

At this restorative stage, as mentioned above, the endothelium becomes permeable, and the micro-organisms from mucous membrane surfaces and from foci of infection may enter the blood stream.

When we now consider the protective function of the mucous membranes against invasion by bacteria, it must be evident that a profound change in the functional status associated with such vasomotor changes will be of significance for the penetration of bacteria, and it can be definitely shown that with, or shortly after, the ARS phase, bacterial penetration is increased. We know that the penetration of such bacteria and their entrance into the blood stream is promptly followed by filtration and the retention of such organisms by the endothelium of the lung, liver, spleen and bone marrow. Usually, this protective mechanism is adequate in the presence of even large numbers of bacteria, and no harm results; but if regions of the vascular bed have been unusually spastic and anoxic, they will present sites where the endothelium is adhesive, and where bacteria may adhere. If such sites are present, infection may then occur. Naturally, the opportunity for the development of anoxia will be greatest in regions where we are dealing with terminal vascular beds, where anastomosis is not effective or where smooth muscle spasticity has increased the interference with proper oxidation. Therefore, we find sites of predilection at the roots of the teeth, about the ear and occasionally in the central nervous system, the joints, the epiphysis of rapidly growing bones, the appendix, etc.

SUMMARY

There is clinical as well as experimental evidence that bacteria from the blood stream are sometimes localized by alteration of the tissues. (Burrows.[3]) Such altered tissue sites are not only regions altered by trauma or by disease, but also, and most often, regions which have been metabolically altered by an anoxia due to vascular spasm. In such areas, the spasm is followed by dilation of the capillary bed and by an increase in capillary permeability and adhesiveness.

In our part of the world, such anoxia due to spasm occurs most commonly when the vascular bed must suddenly adjust itself to meteorologic alterations of unusual degree and intensity. Naturally, the person whose vascular system is unduly labile will be more susceptible.

Atmospheric alterations, therefore, become of major significance, not only for the penetration of bacteria through the mucous membranes when the vascularization and tissue status have changed, but also for the localization of bacteria from the blood stream in regions of preceding spasm.

Here, I would call attention to the most common and frequent cause of bacterial localization; namely, that due to preceding anoxia, most commonly associated with undue vascular spasm incidental to environmental atmospheric changes, which exercise so marked an action upon the vascular system.

In regions subject to the severe strain of atmospheric cyclonic circulation, the human organism must constantly adjust itself to changes in the vascular bed. If the atmospheric change is beyond the range of possible adjustment for the individual or if the individual possesses unusual lability of the autonomic system, bacteria, which are part of the environment, are able to penetrate the capillaries and in two directions, through the protecting mucous membranes into the blood stream, with localization either in tissue filters or in tissues or in organs which have been altered in their reactivity.

Here, I would emphasize that selective localization of bacteria and the intrinsic appearance of bacterial localization without visible or explainable ports of entry is associated with major biochemical and biophysical changes that occur when adjustment has to be made by the body to situations associated with meteorologic changes or with emotional upsets, fatigue, etc. With this in mind, the interrelation of the infected tonsil or the abscess about a tooth and endocarditis, rheumatic fever, chorea or other morbid conditions becomes evident. We can also understand the seasonal tide and the direct connection between the initiation of these diseases or their aggravation and complication and sudden weather changes, and will notice the types of patients which usually succumb to these ailments (children and the asthenic, both having unstable vascular systems).

CONCLUSIONS

1. The seasonal and meteorologic environment, as well as the constitutional type of a patient, should be always taken into consideration in any kind of oral manipulations, but especially in tooth extraction with preliminary "rocking."

2. Consideration should also be taken of the presence of focal infections in other parts of the body.

3. The vascular reaction to the meteorologic environment brings with it periods when bacterial penetration is increased and localization in remote regions will be favored, and, on this basis, we can understand the relations that exist between the environment and tooth abscesses, tonsillitis, endocarditis, rheumatic fever, Sydenham's chorea and other diseases.

4. Persons of vascular instability, in which class we may occasionally include seemingly healthy children, should always receive special consideration in relation to possible postoperative complications of bacterial character, and their focal infections require the most serious attention.

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1608 North Milwaukee Avenue.

ETHICS THE SOUL OF DENTISTRY
(V)

By J. Wright Beach, D.D.S., Buffalo, N. Y.

ACCEPTING the premise that the practical force of applied ethics is of fundamental importance at this time, when members of our profession subscribing to ethical guidance are faced with the challenge of proving our right to existence and perpetuation, our main defense and rightful recourse are found in the ever-expanding heritage from our profession's stalwarts, created through their persistent allegiance to virile practices, which have become our sinews and our strength.

Legion are the examples supported by history and by present-day instances and proving that constant adherence to the principles of ethical practice of dentistry has contributed to the fulness of life, liberty and social and economic privileges of the civilized world. No substitute program for our guidance will ever be found wherefrom the world unit of strength, the family, may receive comparable benefits.

A contributory factor, however, may be found in the economics of applied ethics as a subject worthy of consideration here. The conclusive statement may be made that the application of economics, when tempered by ethical guidance, has never failed to increase the income of the professional man in a healthful and definite ratio. This fact is fundamental, there being few instances indeed wherein financial returns have not kept pace with ethical practices. Tracing the course of relative conditions, a gradual increase in clientele must follow, with augmented prestige in the community and profession, fostering a sense of security, permanency and assurance of continued support. We have but to point to that great body of loyal practitioners comprising the American Dental Association to illustrate these facts.

The progressive dentist, however, appreciates the fact that a due admixture of the ethics of economics also will contribute to the upbuilding of the ideal practice. During recent years, the prodigious development of the mechanics of dentistry as related to artificial substitution has temporarily at least overshadowed the primary objective of preservation and retention of nature's perfect and inimitable creations. No artisan of our profession has the temerity to attempt actual duplication of the efficiency and anatomic perfection of nature's handiwork however close he may approach the esthetic or practical requirements for replacements.

While we stand in admiration of the ingenuity shown in the excellent reproductions that our profession has made available to the masses, to suggest a comparative and technical survey for maintaining a balance essential to adequate service and esthetic considerations might result in definite value at this time.

Basically, the symbol or unit of the ideal in dentistry is the perfect tooth, which cannot be duplicated by man. Therefore, it is our privilege and duty to exercise the highest art to conserve natural lines, curves and contacts. It follows, then, that the ultimate in dental science is approached by combining dexterity, skill and judgment to reach and

retain relative normalcy. Fixed dentures with cast inlay abutments usually demand sacrifice of graceful contours and esthetic lines, which are indifferently restored. There are, however, occasional exceptions to prove the rule, and while the "ends may justify the means," I would append a plea that the use of the abrasive be reasonably circumscribed. To paraphrase famous lines: By artifice we try, forsooth; but only God can make a tooth.

While the foregoing paragraph may seem a bit out of "normal occlusion," it forms the menstruum in which is germinated the fact that the perfect tooth is the symbol of the ethics of our profession. Whosoever idealizes the perfect tooth shall find therein guidance and compensation.

Another phase of this many-sided problem is the fostering of the co-operative spirit between patients and the dentists who serve them. It is a fact that the Code of Ethics of the American Medical Association and that of the American Dental Association combine more effectually to safeguard the public than the members of organized medicine and dentistry. To bring this fact to the attention of our patients would, in many instances, result in a sympathetic understanding of correlated problems.

In our consideration of the subject under discussion, the matter heretofore presented has, advisedly, reflected the dentist's viewpoint only. Would it not be well at this juncture to peer through the large end of the fieldglass, to "see ourselves as others see us"? May we not cast off the protective armor of the cap and gown, that smug professional atmosphere reputed to be ours, and let John Q. Public diagnose our case in the light of present-day psychologic complexes?

This astute analyst doubtless would discover a group of specially trained men who have within the last hundred years created for themselves a sphere of usefulness of stellar value to the human family. He believes that their self-made laws and edicts were fashioned, primarily for their own protection, into an adamantine wall that is impregnable to the public, and from which John Q. would now extract, without anesthesia, those "pillars of the arch" that have been their strength and support during a century of progress.

In this spirit of liberalism, a new school of thought has been introduced into the structure of the profession, and while it may not in itself be looked upon with definite apprehension, it notwithstanding possesses the elements of commercialism, lowered standards and chaotic disintegration. With such a prospect in the foreground (for we must not close our eyes to facts), it behooves us to strengthen our defenses by intensive individual effort within our own ranks to set the young practitioner right in relation to his best interests as well as to the perpetuity of his profession's standards. A united phalanx would effectually protect us from external malefactions and internal collapse.

A service of dominant value is immediately before each one of us. Seek the dentist outside of our Association and bring him into the professional light. Stimulate to interest the lukewarm member, discouraging the spirit of commercialism and self-seeking. To "stand by our guns" with the welfare and love of our profession as the highest motive, our ranks must become invulnerable and our service to humanity dignified and complete.

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AUGUST *Editorial Department* 1940

THE NEW DISTRICT OF COLUMBIA DENTAL LAW

WE learn with much satisfaction that the newly revised dental law of the District of Columbia has finally passed both houses of Congress and was signed by the President on July 2, 1940.

The Government's relation to the laws controlling the practice of dentistry in the District of Columbia gives to the new dental law an association and character quite significant from the standpoint of legality, and it should, and doubtless will, influence the tone and trend of dental legislation in other states. All are familiar with the fact that the District is governed by a commission appointed by Congress and made up of Congressional representatives from various sections of the country, and legislation in the District differs from legislation in the states in that it is recommended and administered by a Governmental body and must be approved by the great national governing body. District legislation, then, is in essence national legislation and assumes a distinct national significance. At least, such legislation comprehends the broadest legal implications and may well be accepted as exemplary legislation.

We have studied the law carefully and we believe that it can safely

and profitably be used as the pattern for dental legislation in the states. In the law under discussion, there are elaborated and comprehensively defined and legally settled several moot points that have caused confusion in and brought complexities to dental legislation in the past.

Much preliminary and preparatory work had to be done by the District of Columbia Dental Society before the bill was in shape for presentation to Congress, and in this connection the tireless and persistent efforts of the committee of the society, under the able direction of Dr. E. M. Colvin, Jr., chairman, and Dr. Henry A. Swanson, secretary, are to be highly commended and the Committee is to be congratulated on its success in obtaining a dental law that may well be the criterion of future dental laws for years to come.

The bill was introduced in the Seventy-Sixth Congress by Representative John J. Cochrane, of Missouri, in the House, and by Senator William H. King, of Utah, in the Senate. It was passed by the House April 24, 1940 and by the Senate June 22, 1940. It was then sent to the President of the United States and was signed by him July 2, 1940; so that Act H. R. 7865 "To amend the act for the regulation of the practice of dentistry in the District of Columbia" is now a law.

Many of the changes and amendments incorporated in the new law are noteworthy and indicate the seriousness of mind with which the committee approached its task. We are particularly impressed with the comprehensiveness of the definition of the practice of dentistry. Ever since entering dentistry, we have observed the efforts that have been made from time to time, and with some success, to define the practice of dentistry for legal purposes; but the evolutional changes being wrought in dental practice through the years, and the persevering cleverness of predatory interests associated with and dependent on dentistry, have enabled some of the bolder of these interests to evade the law in its intent and spirit, while apparently conforming to the letter. The new definition of what constitutes the practice of dentistry is so broad and so definite that it leaves no doubt at any point. In fact, it is so clearly and elaborately set forth that we are impelled to quote the definition in full:

> Section 15. Any person shall be deemed to be practicing dentistry who performs, or attempts or advertises to perform, any dental operation or oral surgery or dental service of any kind gratuitously or for a salary, fee, money, or other remunerations paid, or to be paid, directly or indirectly, to himself or to any other person or agency; or who is a manager, proprietor, operator, or conductor of a place where dental

operations, oral surgery, or dental services are performed; or who directly or indirectly, by any means or method, furnishes, supplies, constructs, reproduces, or repairs any prosthetic denture, bridge, appliance, or any other structure to be worn in the human mouth, except on the written prescription of a duly licensed and practicing dentist; or who places such appliance or structure in the human mouth or attempts to adjust the same, or delivers the same to any person other than the dentist upon whose prescription the work was performed; or who advertises to the public, by any method, to furnish, supply, construct, reproduce, or repair any prosthetic denture, bridge, appliance, or other structure to be worn in the human mouth; or who diagnoses or professes to diagnose, prescribes for or professes to prescribe for, treats or professes to treat disease, pain, deformity, deficiency, injury, or physical condition of human teeth or jaws, or adjacent structures; or who extracts or attempts to extract human teeth, or corrects or attempts or professes to correct malpositions of teeth or of the jaws; or who gives, or professes to give interpretations or readings of dental roentgenograms; or who administers an anesthetic of any nature in connection with a dental operation; or who uses the words "dentist," "dental surgeon," "oral surgeon," the letters "D.D.S." "D.M.D.," or any other words, letters, title, or descriptive matter which in any way represent him as being able to diagnose, treat, prescribe, or operate for any disease, pain, deformity, deficiency, injury, or physical condition of human teeth or jaws, or adjacent structures; or who states, or advertises or permits to be stated or advertised, by sign, card, circular, handbill, newspaper, radio, or otherwise, that he can perform or will attempt to perform dental operations or render a diagnosis in connection therewith or who engages in any of the practices included in the curricula of recognized dental colleges.

We believe this to be a definition of the practice of dentistry that leaves no room for evasion or quibbling. If the courts, in the interpretation of the laws relating to the practice of dentistry, will follow this lead, much legal discussion will be saved.

The new district law has another feature that should inhibit the growing tendency of some laboratory workers to evade the laws prohibiting the practice of dentistry. The new law provides in the section quoted that the laboratory can supply dentures, inlays, appliances, etc., only upon prescription of a legally practicing dentist.

The district law also includes a clause to the effect that the recipient of the licensing certificate must be a citizen.

The section of the bill regulating or prohibiting advertising is, the committee believes, an important provision of the bill, marking a definite advancement in dental legislation. That section of the bill is as follows:

The District Court of the United States for the District of Columbia may revoke or suspend the license of any dentist in the District of

> Columbia upon proof satisfactory to said court that the holder thereof is guilty of advertising professional superiority or the performance of professional services in a superior manner; advertising prices for professional service; advertising by means of large display, glaring light signs, or containing as a part thereof the representation of a tooth, teeth, bridgework, or any portion of the human head; employing or making use of solicitors or free publicity press agents directly or indirectly; or advertising any free dental work, or free examination; or advertising to guarantee any dental service or to perform any dental operation painlessly.

The District of Columbia has long desired and needed an up-to-date dental law and it is believed that, all in all, a highly desirable forward step has been taken in attaining legislation in a key location, as it were, and that will have a most salutary influence on future dental legislation. All the members of the District of Columbia Dental Society are extending their cordial greetings and thanks to the various organized dental groups throughout the United States for their aid in securing the passage of the bill incorporating the revised dental law.

A FULL-TIME SECRETARY FOR THE COUNCIL ON DENTAL EDUCATION

For several years, the American Dental Association has been urged by its large and growing membership to assume a more directive interest in the development of dental education, and to that end they have now taken a notably forward step in bringing to the Central Office Dr. Harlan H. Horner, of New York, as full-time secretary of the Council on Dental Education of the American Dental Association.

Dr. Horner's direct association with the Council will be as executive secretary, and his efforts will, in accord with the evolution of scientific knowledge, clinical experience and social and economic conditions, be directed particularly toward correlating the procedures of dental education with the problems involved in meeting oral health needs; interpreting the relations of dental education to the dental profession and to the public; to facilitating coordination of the efforts of dental schools, dental state boards and dental societies toward maintenance of adequate standards of professional proficiency; promoting a better understanding, in universities and in medical schools and by the public, of the current needs of progressive dental education and dental research in the public interest, to forward the continual development of dental education;

fostering constant improvement in the methods of teaching in dental schools, and encouraging the establishment of conditions that will attract an increasing number of men of outstanding ability to a career of dental teaching.

These are but a few of the many objectives that Dr. Horner hopes to aid in attaining for the American Dental Association, and the experience

HARLAN H. HORNER, A.M., Pd.D.
Secretary of the Council on Dental Education, American Dental Association

and qualifications brought by Dr. Horner to his new field of activity virtually assure us of accomplishments that will shed credit not only upon the dental profession's educational efforts, but also reflexly upon the new secretary.

Dr. Horner comes to his new office direct from an active association with the broad field of education and with numerous educators who have contributed much to the advancement of not only academic education but also, and particularly, professional education.

Graduating from the University of Illinois, with the bachelor of arts degree in 1901, Dr. Horner became secretary to the president of the University, Dr. Andrew S. Draper, and when, in 1904, Dr. Draper was called from the latter position to become the first commissioner of education in New York State, Dr. Horner accompanied him as secretary.

In 1917, Dr. Horner resigned from the department to become dean of the New York State College for Teachers in Albany, in which capacity he served for six years. In 1923, he was called to the newly created office of executive secretary of the New York State Teachers Association, and in that capacity he also served as editor of the *New York State Education,* a magazine published by the teachers' association.

In 1930, Dr. Horner returned to the education department of New York State as director of state college education. He later became associate commissioner of education in charge of higher and professional education.

In 1939, he retired from active duties in the education department; but because of the intense and sympathetic interest that he has for many years shown in all phases of professional education and especially in dentistry, he was persuaded by the Council to accept the position of full-time secretary of the Council; and to say that we have high hopes for the accomplishment of all he has undertaken is but putting it mildly. With the modesty characteristic of one who is thoroughly at home in the field of higher education, Dr. Horner brings to the work of the Council, through acquaintance with the activities of accrediting agencies in higher and professional education throughout the country, an intimate knowledge of the history and progress of all professions and a demonstrated zeal in the development of high standards of education, licensure and practice in dentistry.

As an earnest of the sincerity of purpose with which he will initiate his duties in association with the Council, Dr. Horner pledges his every effort to promote dental education as a university discipline and to emphasize the importance of the scientific aspects of dental study and practice and the growing significance of the biologic approach to all dental problems.

We of the Central Office—and we are confident that every well-wisher

of dentistry joins us heartily—welcome Dr. Horner most cordially to Association Headquarters and pledge to him our sincere cooperation to the end that the biologic concept shall henceforth guide the destinies of dentistry as a humanitarian health profession.

BIBLIOGRAPHICAL

The Enamel of Human Teeth

By MOSES DIAMOND and JOSEPH P. WEINMANN. New York: The Columbia University Press, 1940.

In reviewing a book, it is customary, at the end, to compliment the publisher on the work that he has accomplished. In this review, compliments are extended to the publisher at the beginning. No other dental publication printed in such excellent type on such fine paper and with such perfect cuts of photomicrographs comes to mind. With the research man's point of view in mind, the attention of all publishers and printers of dental magazines and books is called to this monograph and they are urged to try to follow this example of workmanship.

Diamond and Weinmann undertook a hard task in their research. The investigation of the formation and nature of enamel is very difficult because of the many technical obstacles involved.

Formerly, it was believed that calcification of the enamel follows step by step the formation of the matrix, just as dentin or bone develops. Diamond and Weinmann assert that the entire matrix of the enamel is formed before calcification begins. However, they believe that the calcium salts are present in a colloidal state in the organic matrix before final calcification. In the process of final calcification, this colloidal calcium crystallizes into the enamel structure. This calcification does not progress along the incremental lines, as was formerly believed, but starts at the cusps or tips of the incisal edges and progresses at a right angle to the incremental lines. Enamel hypoplasia is considered to indicate a disturbance in the formation of the enamel matrix and is not due to faulty calcification. The first sign of hypoplasia is a degeneration of the enamel matrix-forming cells, the ameloblasts.

A new disease entity, quite different from that commonly known as enamel hypoplasia, is described as the result of a disturbance in the calcification of enamel.

The work opens fields for further investigation; which is just as important in research work as the contribution itself.

BALINT ORBAN.

The Poison Trail

By WILLIAM F. BOOS, M.D. Cloth. 380 pages. Price $3.00. Boston: Hale, Cushman and Flint, 1939.

This is a popularized account of the experiences and activities of the toxicologist, Dr. Boos, written for the laity. Beginning with a short account of how the author through his early training in chemistry became interested in toxicology, the reader is conducted and instructed along various aspects of the problems in forensic medicine. Interspersed among the explanatory notes are accounts of particularly gruesome cases, with which the author no doubt hoped to enliven his volume. The book provides interesting reading for the general reader who has a curiosity regarding the details of investigation pursued by the medicolegal expert.

ASSOCIATION ACTIVITIES

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President's Message

THE CLEVELAND MEETING — SEPTEMBER 9-13

NEXT month, every member of the American Dental Association will be given the opportunity to attend the Annual Meeting. This is also a privilege accorded our Junior Members. While the American Dental Association is at work every day in the year in the interest of the dental profession, it holds but one annual meeting, at which it is the privilege of every member to be present. No one who has not had a part in the organizational activities of his profession can have any idea of the amount of effort that is expended by those whose duty it is to prepare for these annual gatherings. From the adjournment of one annual meeting to the conclusion of the next, a multitude of committees are at work preparing a program for the members of the Association, which will provide for a week of postgraduate instruction such as can be obtained nowhere else. This program will cover a wide range of subjects so as to meet the needs of every member.

The meeting this year promises to be one of unusual interest. Throughout the year, American dentistry is celebrating the centenary of its birth. It is around this theme that the program in Cleveland is being built. This will be emphasized in papers to be read on that occasion; also in bringing to Cleveland the historical exhibits which played so large a part in the success of the Baltimore celebration. Never in the history of the profession has there been brought together under one roof a historical exhibit of such widespread interest. Those who saw it at Baltimore will appreciate another opportunity to study it, and those who were not so fortunate should regard this as a rare privilege.

The Section meetings, which will be of unusual interest and helpfulness, will cover every phase of dental practice. Each Section is in charge of a committee which has been at work for more than a year in an attempt to bring together at one time the most up to date information available in the field of dentistry. These section meetings will provide a postgraduate course of incomparable value.

The general sessions too will be unique. Except for the necessity imposed upon the President, no dentist will appear on this part of the program. Following the invocation, the first session will be addressed by one of this country's most distinguished citizens, Senator James E. Murray of Montana. Senator Murray, who will speak on the subject of "General Health Legislation," has made a friend of every member of the dental profession by his introduction into the United

States Senate of a bill to provide funds for dental research. We are fortunate indeed in having Senator Murray with us on this occasion.

The Reverend Norman Vincent Peale, a son of Ohio, and one of New York City's widely known clergymen and radio speakers, will follow, speaking on "The Art of Living." At this time, when man's inhumanity to man transcends human imagination, when *Might* is being substituted for *Right,* it is altogether fitting that we who believe in the brotherhood of man should pause in the midst of our deliberations and professional activities to consider those eternal verities which lift man above the beast. Dr. Peale is an inspiring speaker and will bring to us a message which would encourage us to meet life's responsibilities in a changing world.

It would also seem to be appropriate in these troubled times, when all that we have learned to revere is in danger of being uprooted, that we should be given an opportunity to listen to one whose world wide experience as a foreign correspondent and lecturer peculiarly qualifies him to interpret current events. At the second general session, Tuesday evening, September 10, Mr. Frederic Snyder, of Kingston, N. Y., will speak on "Our Views and the Hour's News." I know Mr. Snyder personally and can testify to his qualifications for this assignment. He is a magnetic speaker and will bring to us a message full of interest.

At the third general session, Dr. Earnest A. Hooton, professor of anthropology, Harvard University, will give an informal lecture illustrated with slides. Dr. Hooton is the author of the well-known book "Apes, Men and Morons," in which he emphasizes the importance of the human dentition in the preservation of the human race. We are fortunate indeed in obtaining Dr. Hooton's consent to speak to us on a subject on which he is a recognized authority. His subject will be "An Anthropologist Ruminates on Dentition and Devolution."

The Local Arrangements Committee, of which Dr. Gentilly is chairman, is sparing no pains to make the centennial celebration of the American Dental Association an outstanding event. For more than a year, this committee has been at work preparing for a meeting which promises to be without a parallel in the history of the Association. It will be unique in that it will celebrate the centenary of American dentistry. Never again in the life of any member will there be a dental meeting of like importance. Only the attendance of our members in large numbers is needed to make this Eighty-Second Annual Meeting of the American Dental Association an unqualified success. Remember the date: September 9 to 13, 1940.

Arthur H. Merritt

BUREAU OF PUBLIC RELATIONS

STUDY OF A DENTAL PROBLEM IN PUBLIC HEALTH*

By LEON R. KRAMER, D.D.S., M.P.H., Topeka, Kans.

AT the present time, there are available valuable data regarding dental diseases and related conditions. These data have been collected on a national scale by the United States Public Health Service.[1] The National Institute of Health,[2] state and local health departments, research investigators and others have also collected and published such data.

Comparatively little effort has been made, however, to analyze the data with a view to applying the findings to practical problems in the dental phases of public health.

From this standpoint, we thought it worth while to examine the data to see if their study would shed some light on one of the administrative problems in conducting a dental program.

THE PROBLEM

Perhaps the first and most important problem that confronts the administrator of a dental health program is this: "With limited funds available, at what age groups of children should efforts be directed to render the greatest service at least cost?"

For reasons expressed by students of this problem,† and for practical purposes, I have selected the age group 6 to 16 for this study. From this group, we may then select those attending grade schools; namely, 6 to 14.

To determine certain age groups in the years 6 to 16 in which the most effective service can be rendered, it is necessary to have a detailed picture of the progressive stages of dental decay in the permanent teeth during this period.

DATA REQUIREMENTS

That our final conclusions should be as accurate as possible, we required data from examinations of children that were made by one skilled dentist. This condition would remove many of the variables necessarily present in data when the examinations have been made in clinics, dental surveys and surveys of similar type, by two or more examiners. It was believed that these data would more surely reflect the true condition of children's teeth than did even the excellent work done by Franzen, in which the examinations were made by several conditioned examiners.[3]

We required data from at least 1,000 children who had been examined under the conditions outlined; in a survey wherein the recordings were made on uniform report cards and the criteria as to what constitutes a cavity were uniform.

Data meeting these specifications[4] were made available by E. C. McBeath, D.D.S., of the College of Oral and Dental Sur-

*Submitted in partial fulfilment of the requirements for the degree of master of science in public health.

From the DeLamar Institute of Public Health, Columbia University.

†E. C. McBeath, Bion R. East, F. C. Cady and others.

gery, Columbia University. These data are a collection of more than 1,100 case records used in his research activities in vitamin D and other studies. These records are perhaps as accurate as any in existence. The data used in this study are the initial examinations of McBeath's studies in vitamin D and other studies. Therefore, the caries count is not influenced by subsequent feeding.

PUNCH CARD SYSTEM DEVISED TO RECORD DATA

To facilitate the handling of these data and to increase the accuracy of recording and counting, a punch card system was devised. Of the data presented on the case records, the following items were recorded on the punch cards: case number, month, day, year, school, age, sex, color, race, weight, gingival condition (three degrees) and nutritional status, with thirty-two columns for permanent tooth records and twenty columns for deciduous tooth records. The numbers in the column for each tooth were coded as follows: 12, 11, 0 and 1 for recording carious attacks on the occlusal surface; 2-, mesial; 3-, distal; 4-, buccal; 5-, lingual, and 6-, gingival surfaces, respectively; 7-, missing; 8-, filled teeth, and 9-, filled teeth with new decay. There were only six of the carious areas of the teeth in the entire mouth that could not be properly recorded by this system: two of three pits on the labial surface of the two upper central incisors and one each of two lower molars having diseased buccal grooves. On these data, this system was 99.997 per cent accurate. The caries mentioned above was properly added to the count.

FINDINGS

The men previously mentioned suggested that one of the lower first molars would best serve as an index for this type of study because it is usually the first permanent tooth to erupt. The findings in this phase of our study are confined to those which describe the morbidity and mortality of the lower right first permanent molar; its relationship to the caries experience of the other teeth in the same jaw, and the pathologic conditions of the investing tissues in the lower right side of the mouth. It shall be understood that all references to teeth and gums in this discussion will hereafter be confined to those in the lower right portion of the mouth. Of the 1,105 cases of white children recorded, 1056, representing 545 boys and 560 girls, fell into the age group 6 to 16 in the numbers listed in Table 1.

Since the problem concerns school children as a group, no differentiation as to sex was made in this study. For ease in comparison, the population of each age group was calculated to represent 100 children in each group. This adjustment makes a total population of 1,000.

Table 2 records the caries experience of the first permanent molar from the approximate time of eruption through the following ten-year period. Column a gives the surface affected and the tooth status ("missing," "filled," etc.). Column b shows the number of permanent molars per hundred children of age 6 which were diseased or missing, the decayed areas occurring on each surface and the total number of carious areas observed in the 6-year-age group. The percentage of times each surface is attacked is shown in column c. This treatment applies to

TABLE 1.—DISTRIBUTION OF 1,056 CASE RECORDS USED IN THIS STUDY (AGES 6 TO 16)

Age	6	7	8	9	10	11	12	13	14	15	Total
No.	30	42	111	146	151	133	138	153	107	45	1,056

TABLE 2.—RECORD OF PROGRESSIVE STAGES OF CARIES OF LOWER RIGHT FIRST PERMANENT MOLAR AS OBSERVED IN 1,000 CHILDREN, AGED 6 TO 16 (100 CHILDREN IN EACH AGE GROUP)

a		b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
Diseased and Missing Teeth per 100 Children	Code 27	23		55		69		70		88		83		81		79		79		87		685	
		6 Yrs.	Per Cent	7 Yrs.	Per Cent	8 Yrs.	Per Cent	9 Yrs.	Per Cent	10 Yrs.	Per Cent	11 Yrs.	Per Cent	12 Yrs.	Per Cent	13 Yrs.	Per Cent	14 Yrs.	Per Cent	15 Yrs.	Per Cent	Total Number Carious Surfaces	Total Caries by Surface Per Cent
Occlusal surface	0	3.3	12.4	2.4	2.8	2.7	3.0	4.2	4.6	6.0	5.4	2.2	2.0	9.5	7.2	3.9	3.3	1.8	1.6	11.0	9.5	47.0	
Occlusal surface	1	20.0	75.5	47.0	64.5	57.0	61.5	53.0	58.2	63.0	57.0	65.0	60.0	65.0	50.0	63.0	54.4	59.0	55.0	60.0	52.5	552.0	
Total occlusal surface		23.3	87.9	49.4	67.3	59.7	64.5	57.2	62.8	69.0	62.4	67.2	62.0	74.5	57.0	66.9	56.5	60.8	58.0	71.0	62.0	599.0	61.20
Mesial surface	2					0.9	1.0	1.4	1.6	4.0	3.6	5.2	4.7	4.3	3.3	9.8	8.4	9.4	8.3	4.0	3.9	39.5	4.06
Distal surface	3					1.9	2.0			2.6	1.9	3.8	3.5	5.1	3.9	2.0	1.7	7.5	6.7	11.0	9.5	33.9	3.46
Buccal surface	4	3.3	12.0	24.0	33.0	30.0	32.5	32.4	35.8	34.0	31.0	33.0	31.0	45.0	34.4	38.0	32.8	33.6	29.2	29.0	25.3	302.3	31.10
Lingual surface	5									1.3	0.9	0.7	0.6	0.7	0.5							2.7	0.003
Gingival surface	6													0.7	0.5			0.9	0.8			1.6	0.002
All surfaces		26.6		73.4		92.5		91.0		110.9		109.9		130.3		116.7		112.2		115.5		979.0	99.825
Missing	7	0		*2.4				4.8		6.1		9.8		6.5		11.0		13.0		20.0		73.6	
Filled	8	0		4.7	6.4	9.0	8.2	15.0	16.5	16.0	14.5	28.0	25.6	22.0	17.0	35.0	30.0	31.0	26.3	42.0	36.5	202.7	
Filled; new caries	9	0		4.7	6.4	3.6	3.9	9.0	9.9	10.0	9.1	10.5	9.6	10.8	8.3	6.5	5.6	6.5	5.8	4.5	3.9	66.1	

*Unerupted.

each age group. The last three lines indicate the number of "missing," "filled" or "filled, with new caries," teeth occurring in each age group.

Only two of the six attack areas of the first molar are shown to be affected by caries during the sixth and seventh years. As time goes on, we note the increasing number of instances of decay of the other surfaces. In the ninth year, we note the loss of about five permanent molars. It is interesting to observe how this loss reduces the caries count.

In the "total all surface" line, we see the rather large increase in the caries increment in years 6 to 7 and 8. From 6 to 7, 46.8 new cavities are observed, and from 7 to 8, 19.1 new cases of caries are shown. For the remainder of the ten-year period, the rate increase is in most instances considerably less. The loss of permanent molars apparently does much to reduce the number of decayed areas.

Column v indicates that 685 of 1,000 molars were diseased or missing. Reading down this column, we see the number of times each surface was attacked. The total number of areas attacked is 979, or slightly less than 1,000 decayed areas in 1,000 molars in the ten-year period observed. Seventy-three and six-tenths first permanent molars were missing. Of the 979 decayed areas, 269, or 27 per cent, were filled. Of the teeth filled, 66.1 developed new caries. Column w shows in percentage the number of times each surface was attacked by dental caries. We observe that pits and fissures on the occlusal surface plus the buccal groove account for 92.3 per cent of the entire number. In other words, the occurrence of decay in pits and fissures as compared with smooth surfaces on this molar is approximately 9 to 1. This observation is of particular value for setting up an "expected" table for purposes of prediction and cost accounting.

For many years, it was believed that caries "spread" from one tooth to another. The mesial surface of the lower first permanent molar is in contact with the second temporary molar for a period of approximately four years. The distal surface of this tooth has no contact with another tooth surface for approximately six years after its eruption. If contact played a part in increased attack on the contacting tooth, we should expect a significant difference in the caries count on the mesial surface of the molar as compared with the distal surface.

The total score recorded in these findings, 39.5 mesial and 33.9 distal, does not show a statistically significant difference. They do indicate, however, factors that should be given more study to explain why the mesial caries score on the first permanent molar is consistently higher than the distal score, as shown in studies with which we are familiar.[5] This problem has a definite bearing on decisions to be made by an administrator in regard

TABLE 3.—COMBINATION COUNT

Combination Caries Attack, Lower Right First Permanent Molar	Age 6	7	8	9	10	11	12	13	14	15	Number of Combination Attacks by Surface
Occlusal 2 areas		2.4		4.1		2.2		3.9		11.0	23.6
Mesioclusal				1.4		5.2		9.8		4.5	20.9
Distoclusal						3.8		2.0		8.9	14.7
Buccoclusal		19.0		35.0		26.0		30.0		22.0	132.0
Mesioclusodistal						2.2		0.6		2.2	5.0
Mesioclusobuccal				0.7		2.2		3.3		2.2	8.4
Mesiodistoclusobuccal						1.5		1.3			2.8
Combination attacks (age)		21.4		41.2		43.1		50.9		40.8	207.4

TABLE 4.—DISTRIBUTION OF DECAYED SURFACES IN TEETH IN LOWER RIGHT MANDIBLE IN 1,000 CHILDREN IN THE TEN-YEAR-AGE GROUP 6 TO 16*

TABLE 4.—DISTRIBUTION OF DECAYED SURFACES IN TEETH IN LOWER RIGHT MANDIBLE IN 1,000 CHILDREN IN THE TEN-YEAR-AGE GROUP 6 TO 16*

a	b	c		d								e	f	g		h		i		j		k		l	m	n
Age Years	Lower Right First Permanent Molar Diseased or Missing	Lower Right Second Permanent Molar		Lower Right First Molar Surfaces								Lower First Permanent Molar		Lower Second Temporary Molar		Lower First Temporary Molar		Lower Temporary Cuspid		Lower Right Lateral Incisor		Lower Right Central Incisor		Entire Lower Right Jaw		First Right Lower Permanent Molar
		No. All Surfaces	% Total for Years	Occlusal	Occlusal	Total Occlusal	Mesial	Distal	Buccal	Lingual	Gingival	No. All Surfaces	% Total for Year	No. All Surfaces	% Total for Year	No. All Surfaces	% Total for Year	No. All Surfaces	% Total for Year	No. All Surfaces	% Total for Year	No. All Surfaces	% Total for Year	Total Decayed Surfaces 100 Children	Percentage of Total 1,000 Children by Age	Missing
6	23			3.3	20.0	23.3			3.3			26.6	18.2	70.1	48.0	49.9	43.0							146.6±21	7.8	
7	55			2.4	47.0	49.4			24.0			73.4	34.4	73.4	34.4	66.4	31.1							213.7±22	11.7	2.4†
8	69			2.7	57.0	59.7	0.9	1.9	30.0			92.5	39.5	72.6	31.0	63.3	27.3	4.7	1.7					233.1±17	12.6	
9	70			4.2	53.0	57.2	1.4		32.4			91.0	53.3	45.1	26.1	32.1	18.6	2.8	1.6			7.4	0.4	171.7±14	9.2	4.8
10	88			3.0	63.0	69.0	4.0	2.6	34.0	1.3		110.9	72.0	29.0	19.0	12.6	8.2	0.7	0.5			0.7	0.5	153.9±9.8	8.2	6.1
														2nd bicuspid		1st bicuspid		permanent								
11	83	17.3	13.0	3.0	65.0	67.2	5.2	3.8	33.0	0.7		109.9	82.0	6.6	5.0									133.8±10	7.2	9.8
12	81	38.9	21.0	9.5	65.0	74.5	4.3	5.1	45.0	0.7	0.7	130.3	72.0	10.8	5.9	2.2	1.1							182.2±8.7	9.7	6.5
13	79	53.2	29.0	3.9	63.0	66.9	9.8	2.0	38.0			116.7	64.0	8.6	5.3	3.2	1.8					0.6	0.3	182.3±10.8	9.7	11.0
14	79	78.9	37.0	1.8	59.0	60.8	9.4	7.5	33.6		0.9	112.2	53.0	16.8	8.0	2.7	1.0							210.6±14	11.2	13.0
15	87	88.8	35.0	11.0	60.0	71.0	4.5	11.0	29.0			115.5	48.0	19.9	8.3	8.9	3.7	6.6	2.6					239.7±23	12.7	20.0
																								1,867.1±7.8	73.6	

*The table also gives in detail the decayed surfaces on the first permanent molar.

†Unerupted.

to the relative importance of treatment of deciduous teeth as a preventive measure against contact infection of permanent teeth.

Table 2 shows in detail the experience of individual surfaces of the first permanent molar from the approximate time of its eruption through a period of ten years.

It would now be well to determine how often two or more decayed surfaces appear at the same time.

The record of the combination count is shown in Table 3, in two-year periods beginning at the seventh and ending at the fifteenth year of age. This table also shows the high increment rate between age 7 and age 9, and thereafter the similarity of the experience in rate decrease as shown in Table 2. Table 2 indicates that the lost molars were responsible for this condition. It also shows the importance of "time" in the picture of tooth decay.

The combinations of decayed areas, according to the number observed, occur in the following order:

Buccoclusal, occlusal (two areas), mesioclusal, distoclusal, mesiobuccoclusal, mesiodistoclusal, mesiodistobuccoclusal.

The next question is, "How is the caries experience of the first permanent molar related to the carious attack on other teeth in the same segment of the jaw during the ten-year period?"

In Table 4 are recorded the caries experience of the first permanent molar by surface and the total number of carious areas found in other teeth in the same jaw. It also records for each age group the percentage of the total score contributed by each tooth. For example, at the age of 6, twenty-three of 100 molars were decayed. Twenty-three and three-tenths cases occurred on the occlusal surface; 3.3 cavities occurred in the buccal surface; a total of 26.6. The first permanent molar contributed 18.2 per cent of the cavities occurring in the lower right jaw. The second temporary molar scored a total of 70.1 decayed areas, or 48.0 per cent of the total; etc. During the period 9 to 14, the first permanent molar contributed more than 50 per cent of the total caries in the lower right mandible. At the age of 10, it accounted for 72 per cent; age 11, 82 per cent, and age 12, 72 per cent. This fact indicates that complete corrective service applied to this tooth would reduce the morbidity for the entire jaw more than 50 per cent.

Column l gives the score for each year and the total score for the ten-year period. Column m gives the percentage each age group contributed to this total score (1,867). Column n indicates the number of missing permanent molars.

To better illustrate the findings recorded in Table 4, a chart was prepared (Fig. 1), presenting graphically the total caries experience over the period 6 to 16 and the contribution that the deciduous and permanent teeth made to the total score. It also shows the years and the relative importance of the deciduous teeth, together with the caries experience in the first permanent molar, as causative factors in the peak cavity score the eighth

TABLE 5.—GUM PATHOSIS, SHOWING DISTRIBUTION AND DEGREE BY AGE IN 1,000 CHILDREN

Gum Pathosis	6	7	8	9	10	11	12	13	14	15	Total	Gum Morbidity Per Cent
Mild		7.2	19.0	22.6	24.4	26.0	32.0	31.0	32.0	20.0	214.2	21.4 ± 1.4
Moderate			0.9	5.5	6.0	3.0	5.1	6.0	3.7	6.6	36.8	3.7 ± 0.6
Severe			3.6	0.7	4.0	6.0	5.1	6.0	1.8	2.2	29.4	2.9 ± 0.5
Total	0.0	7.2	23.5	28.8	34.4	35.0	42.2	43.0	37.5	28.8	280.4	28.0 ± 1.6

year. It indicates the influence of the shedding and loss of deciduous teeth as the major factor in the depression reaching its lowest point at age 11. The caries experience in the permanent teeth and contributions made by each tooth to the second peak at age 15 are also shown.

GUM PATHOLOGY

Disease of the gums and the factors entering into it are important. Therefore, this study must include findings relative to the tissues in which the teeth are invested. (Table 5.) These observations seem to show the influence of exfoliation of the temporary teeth on gum morbidity. We note peaks in the "mild" and "severe" columns in the 12, 13 and 14 year age groups, with a tapering off in the fifteenth year.

The "moderate" classification seems more constant. We note, however, that there were 280 children of the 1,000 who had gingival disease. The rate per hundred is 28 ± 1.6. The results emphasize the importance of this problem. They also suggest the need of a study to determine the extent that this morbidity could be reduced by proper oral hygiene.

APPLICATION OF FINDINGS TO PROBLEM

Specifically, the problem is to determine and to designate the smallest number of age groups in grades 1 to 8 in which procedures can be applied to prevent the loss of permanent teeth and associated morbid conditions.

By a process of elimination, only such findings as had a direct bearing on the problem as herein outlined were used. Since the first permanent molar was selected as an index, it was evident that a chart should be constructed that showed its morbidity and mortality experience over the ten-year period. The morbidity experience should be shown both by number of carious areas and by number of decayed teeth. To this picture should be added the caries experience contributed by permanent teeth other than the first molar.

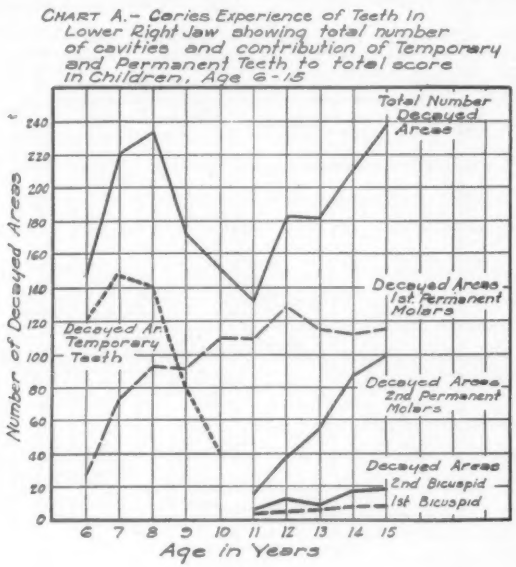

Figure 1.

The chart, B, shown in Figure 2 was constructed to present these findings.

We see that caries experience begins at the age of 6 and mortality experience begins at 9, with a loss of 4.8 teeth. This relationship indicates that five out of 100 first permanent molars will be lost in approximately three years' time. We note too how the loss of these molars influence the trend in caries experience.

At this point, selection will be attempted of the smallest number of age groups from ages 6 to 14 wherein corrective procedures will prevent the mortality of first permanent molars indicated on the bottom line of the chart.

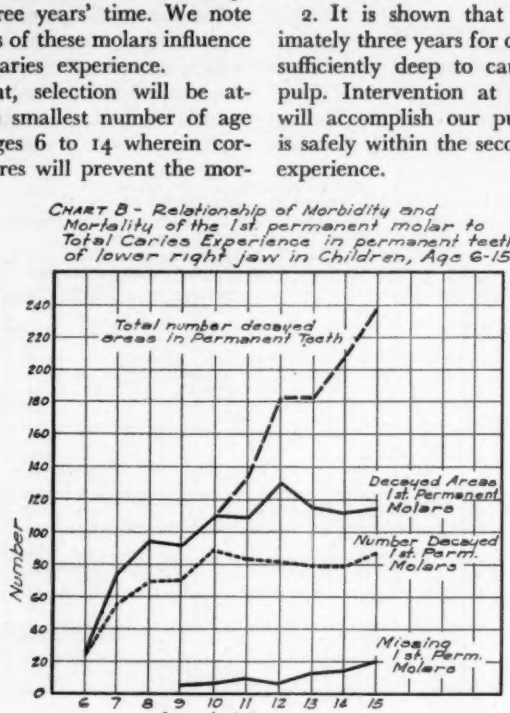

Figure 2.

In considering the eighth year, we find that the last half borders directly on the first half of the year in which loss occurs. The eighth year would be too late to apply corrective procedures.

The sixth year shows that, even under the most exacting examination procedures, only twenty-three of 100 teeth evidence decay.

There are three important facts that favor the selection of the seventh year over the sixth and eighth for applying operative procedures:

1. This age approximates the year in which decay was first in evidence. Corrective procedures may be applied with the assurance of safety and prevention at this time.

2. It is shown that it takes approximately three years for caries to penetrate sufficiently deep to cause death of the pulp. Intervention at age 7, therefore, will accomplish our purpose because it is safely within the second year of caries experience.

3. This particular age is one year before the first peak of dental caries, which occurs at the eighth year. This peak is followed by a depression caused by the loss of the molars, indicated in the ninth year. Corrective procedures applied at the seventh year should prevent the loss that is shown to occur in the ninth year. By similar reasoning, we would select the ninth and the eleventh year.

The thirteenth year occupies much the same position relative to the second permanent molar as does the seventh year

relative to the first permanent molar. It also coincides with the periods previously selected.

CONCLUSIONS

1. The findings here presented, I believe, supply a reasonably sound basis for selecting the years 7, 9, 11 and 13 as the ages at which the most effective service can be rendered, under the conditions stated in the problem.

2. These findings seem to support the belief that analysis of data available will lead to a better understanding of, and a more scientific approach to, current dental problems.

3. A similar study should be made of the temporary teeth at ages 2 to 12.

4. These data seem to indicate that if caries is not allowed to progress untreated beyond the second year, tooth loss due to caries will be reduced to a minimum.

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Kansas Capitol Building.

Building Sound Teeth for the Coming Baby. Prepared by the Committee on Community Dental Service of the New York Tuberculosis and Health Association, Inc., in cooperation with the Sub-Committee on Dental Education, Lower West Side District Health Committee of the Committee on Neighborhood Health Development, Department of Health, City of New York, 386 Fourth Ave. Price 10 cents.

A new pamphlet, "Building Sound Teeth for the Coming Baby," just issued by the New York Tuberculosis and Health Association, is meeting with favorable response. It covers a wide range of dental hygiene topics of vital importance to the prospective mother and furnishes pertinent information for professional workers, such as the time when the child's teeth begin to form, how the prospective mother can provide the best possible teeth for her child, a list of foods that build good teeth and an outline of the dental care that a prospective mother needs.

The text, which has been submitted to and approved by more than a score of authorities in the dental and medical fields, is designed particularly for nurses, nutritionists and social workers.

COUNCIL ON DENTAL THERAPEUTICS

ABSTRACT OF FEDERAL TRADE COMMISSION STIPULATION ON COLGATE'S DENTAL CREAM

THE Colgate-Palmolive-Peet Company, Jersey City, N. J., and its subsidiary, Kirkman & Son, Inc., New York, have entered into a stipulation with the Federal Trade Commission in which they agree to cease and desist from certain representations in the sale of soap products.

The respondents also agree to cease advertising unqualifiedly that "most bad breath begins with the teeth" or that "a safe, sure way to correct bad breath is through regular use of the thorough, cleansing action provided only by the special ingredients in Colgate's Dental Cream." (Stipulation 2867.)

FEDERAL TRADE COMMISSION ORDER ON AL VIOLA DENTAL PLATE TIGHTENER AND RELINER

THE Federal Trade Commission has ordered Carey Carr, trading as Al Viola Products, 1225 Keniston Ave., Los Angeles, to discontinue certain misrepresentations in the sale of a preparation for tightening dental plates.

Under the order, the respondent is directed to cease representing, directly or through inference, except in unusual and exceptional cases in which the condition of the mouth is favorable to the use of such method, that the use of his preparation, "Al Viola Dental Plate Tightener and Reliner," constitutes a competent or effective method for tightening dental plates, supplies an improved fit for such plates or accomplishes satisfactory results.

The order further forbids representations that the respondent's preparation may be applied effectively by any one other than an expert or that its satisfactory use requires no expert assistance. (Order 4045.)

PRESCRIBING SUGGESTIONS

THE rational use of drugs and chemicals is an essential part of dental practice. Over a period of years, the Council has issued numerous reports designed to aid the dentist in the selection of drugs and chemicals of demonstrated usefulness. Many of these are National Formulary and U. S. Pharmacopoeial substances, listed and adequately described in Accepted Dental Remedies 1939. In order that the dental profession may use acceptable and official products, and to the best advantage, the following formulas have been suggested.

The Council appreciates the cooperation of George C. Schicks, assistant dean of Rutgers University and chairman of the Committee on Dental Pharmacy of the American Pharmaceutical Association, in the preparation of the formulas.

SERIES VII

STYPTICS

a)

℞	Metric Approximate	Apoth. Equivalents
Liquor Ferri Subsulfatis, N.F.	30.0 cc.	℥ i

Sig.: Apply to bleeding part on cotton or gauze; styptic.

Note: Common name, Monsel's Solution.
Prompt styptic for control of hemorrhage after extraction of teeth.
Not used internally.
Incompatibilities: Any compounds containing tannin or tannic acid, hydroxides and sulfides.

b)

℞	Metric Approximate	Apoth. Equivalents
Acidi Tannici	1.2 gm.	gr. xviiiss
Aquae Destillatae q.s. ad.	60.0 cc.	℥ ii
M. ft. sol.		

Sig.: Apply to bleeding part on cotton or gauze.
Astringent and styptic.
To control hemorrhage.
To give relief in burns.

Note: 0.5—2 per cent used locally. Prescription calls for 2 per cent tannic acid, 2-5 per cent used as wet dressing or sprayed on burns.
Glycerite of tannic acid is more stable and is used to make dilutions. It is more pleasant to taste.
The glycerite is 20 per cent strong. To make 2 per cent dilution, use as follows:

Glycerite tannic acid	6.0 cc.	℥ iss
Distilled water q.s. ad.	60.0 cc.	℥ ii

Incompatibilities: Salts of iron, alkaloids, albumin, gelatin.

DILUTED TALBOT'S SOLUTION

c)

℞	Metric Approximate	Apoth. Equivalents
Zinc Iodide	4.8 gm.	gr. lxxivss
Iodine	6.0 gm.	℥ iss
Glycerin	33.0 cc.	℥ i m. xlviii
Distilled water q.s. ad.	60.0 cc.	℥ ii
M.		

Sig.: Diluted Talbot's Solution.

Note: Antiseptic and astringent for pericementitis, gingivitis, mouth wounds and lacerations.
May be diluted with water to suit varying conditions.
Write for by official title: Glyceritum Iodi et Zinci Iodidi, N.F.

d)

℞	Metric Approximate	Apoth. Equivalents
Sod. Borate	3.0 gm.	gr. xlviss
Glycerin	1.2 cc.	m. xx
Fldext. Rose	3.0 cc.	m. xlviii
Mel. q.s.	30.0 gm.	℥ i
M.		

Sig.: Apply to mouth for stomatitis and thrush.

Note: Write for by official title, Mel Rosae et Sodii Boratis, N.F.

ACCEPTED DENTAL REMEDIES

The Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following articles in the list of Accepted Dental Remedies.

DENTIFRICES*

Brundage Tooth Paste: Composition: Each hundred grams is stated to contain gum karaya, 1.09 gm.; glycerin, 20.02 gm.; soap, 0.85 gm.; water, 33.03 gm.; saccharin (water soluble), 0.04 gm.; flavor, 0.73 gm.; chalk (Peerless medium light), 30.04 gm.; magnesium carbonate, 5.86 gm.; hydrated magnesia 30 per cent, 8.30 gm.

ABRASIVENESS: 4.75 mg. on antimony block under weight of 63 gm. in 6,000 revolutions (Peerless apparatus).

Manufactured by Allied Products, Inc., Suffern, N. Y. Distributed by J. R. Brundage, Inc., New York, N. Y.

Admission of an article to the list of Accepted Dental Remedies does not imply a recommendation. Information regarding the rules and work of the Council will be sent on request.

HAROLD L. HANSEN, *Secretary.*

*A.D.R. 1940, p. 108.

NATIONAL HEALTH PROGRAM COMMITTEE

THE following is the report of the Federal Security Administration on the dental research bill (S. 3607) which is now pending before the United States Senate. It will be noted that Mr. Wayne Coy, acting administrator of the Federal Security Administration, states that he is "convinced that provision of the necessary funds for research in this field would be a very profitable investment for our Government to make at this time."

FEDERAL SECURITY AGENCY
Washington

May 25, 1940.

This bill proposes to authorize and direct the Surgeon General of the Public Health Service to conduct researches, investigations, experiments and studies relating to the cause, diagnosis and treatment of dental diseases; to assist and foster similar research activities by other agencies, public and private, and to promote the coordination of all such researches and activities and the useful application of their results, with a view to the development and prompt, widespread use of the most effective methods of prevention, diagnosis and treatment of such diseases. An appropriation for the fiscal year ending June 30, 1941, in the amount of $75,000 with an increase of $10,000 each year for the five succeeding years is authorized.

The ubiquitousness of dental diseases needs no reiteration, only a very small percentage of the population escaping its ravages. Dental caries (decay) and the periodontal diseases (pyorrhea) are the two major dental diseases. Of these two, dental caries is the more important. About six months ago, the Research Commission of the American Dental Association published in a monograph entitled "Dental Caries" the findings and conclusions of 195 observers and investigators in twenty-three countries. No more succinct summation of this problem can be found than in the preface of this book. It follows:

Dental caries is the most prevalent of dis-

eases. Very few persons now escape its attacks. It begins in early childhood and usually continues until most teeth have been affected. Arrest of caries, treatment of its sequelae and repair and restoration, required by its destructive effects, are the most general present functions of the health-service of dentists. Despite the universal incidence of caries and its deleterious consequences, the causes of caries have not been completely established, and its general prevention has not been attained. Many careful researches and numerous competent clinical observations relating to the etiology of caries have been made during a long succession of years by able and devoted students of the problem, yet the results have been discordant, the conclusions contradictory and the outcome confusing. Neither an assured body of facts relating to etiology nor an accepted procedure for prevention emerged from past efforts in research and clinical inquiry. Prevention of caries—like prevention of the "common cold" and cancer—awaits further discovery. . . . Prevention of "the most prevalent of all diseases" assuredly deserves special attention from all who aim to conserve the public health and who seek to provide protection against the economic consequences of illness and disability.

Certain investigation in dental caries, periodontal disease and mottled enamel have been carried on in the Division of Infectious Diseases, the Division of Chemistry and the Division of Public Health Methods of the National Institute of Health. These studies, limited as they are, have reached wide acclaim in scientific circles, and I am convinced that provision of the necessary funds for research in this field would be a very profitable investment for our Government to make at this time.

In recommending special provision for this line of public health activity, it may be noted that problems of dental care form a distinct field which has traditionally been approached as a separate problem in medicine. Dentistry is probably the most universally recognized field of specialization. There are at present some 62,000 dentists devoting the whole of their professional time to this specialty. The American Dental Association, with some 45,000 members, is an independent organization devoted entirely to this field. Over 90 per cent of the population are suffering from dental diseases which are regularly treated by the medical profession as exclusively within the scope of the dentist's special care. It is thought to be right and proper that the Federal Government's public health activities should provide special endeavors in this distinct field of medicine.

Although it is true that special legislation authorizing research in the dental field is not necessary to permit the Public Health Service to carry on this work, additional funds would be necessary to carry out the program outlined in this legislation.

As a matter of detail and for the purposes of clarification, it is suggested that on page 1 of the bill at line 3 after the word "service" there be inserted the following, "under the supervision of the Federal Security Administrator."

We are advised by the Bureau of the Budget that inasmuch as no authorizing legislation is prerequisite to the accomplishment of the purposes set forth in this bill, expenditures are now being made and estimates are included in the 1941 budget for a certain portion of this work and the Public Health Service is actually conducting a certain amount of research and investigational work along the lines indicated, the enactment of the proposed legislation would not be in accord with the program of the President.

(Signed) WAYNE COY,
Acting Administrator.

COMMITTEE ON LEGISLATION

STATE DENTAL LEGISLATION, 1940

THIRTEEN state legislatures have been in session so far this year. Eight of these met in regular session in which any type of legislation could be considered. Four met in special session wherein legislation was restricted to subjects on the governor's call and dental legislation was not included. Dental bills could have been introduced at the special session of the Maine Legislature, but none were reported.

Each state society was notified of every bill which had any bearing on the practice of dentistry in its state, and of all subsequent action taken by the legislature. A complete record of the action on each bill is also maintained at the Central Office of the American Dental Association. This summary includes only those bills deemed to be of the greatest importance and interest to the dental profession.

CALIFORNIA
Recessed to December 2

Bills enacted: Senate Bill 68-X makes a number of changes in the narcotic law. None of the changes appear to alter materially the purpose or scope of the present law.

ILLINOIS
Special Session Adjourned June 5

Legislation is limited to the subjects included in the governor's call. No dental legislation was introduced.

KENTUCKY
Adjourned March 14

Bills enacted: House Bill 354 amends the state narcotic law to conform to the Uniform Narcotic Drug Act. Most of the changes deal with definitions of words and phrases. A dentist is defined in this law as "a person authorized by law to practice dentistry in this state."

Bills not enacted: Senate Bill 196 proposed the elimination from the dental practice act of the provision which prohibits dentists from advertising credit or terms of credit. Senate 199 provided for the licensing, regulation and inspection of hospitals and clinics by the hospital advisory board. House 403 proposed a $6 occupational license tax on lawyers, public accountants, barbers, practitioners of the healing art and others. House 416 proposed the transfer of a number of licensing boards, including dental, to the department of health. The boards were to continue as separate agencies except that all matters of administration were to be cleared through the commissioner of business. The bill also gave the governor the power to reject lists of recommendations for board positions and ask for others.

LOUISIANA
Adjourned July 11

Bills enacted: H. 653 revises the state dental practice act. The new law requires all applicants for dental licenses to be citizens of the United States. As introduced, the bill proposed the selection of a nine-member board, one member from each district, but this proposal was amended by the House to provide for a five-man board only. These men are to be selected by the governor. Another change over the old law is the provision prohibiting the construction of dentures except on the prescription of a licensed dentist.

Bills not enacted: S. 294 provided that narcotics could be sold only on written orders from legally authorized persons. Dentists were included among persons

authorized to obtain narcotics. S. 345 required hospital service organizations to pay an annual license fee of $250 in lieu of all taxation. S. 370 proposed amendments to the amount of advertising that dentists are permitted to do. S. 387 proposed the establishment of a workmen's compensation commission to draft a workmen's compensation law for the state. H. 963 proposed that the Department of Welfare be authorized to contract with individual dentists for the dental care and treatment of needy residents of the parish where the dentist resided. H. 623 required the state to operate free clinics to supply patients with medicine. H. 934 prohibited the sale of amytol, luminal and other drugs, except on the prescription of a physician, dentist, surgeon or veterinary.

MAINE
Special Session
Recessed to July 22

No dental legislation reported.

MISSISSIPPI
Adjourned May 13

Bills enacted: H. 150 regulates the sale of barbiturates except on prescription of a licensed physician, dentist or veterinarian. H. 1137 revised the privilege tax code with regard to license fees of all types. Dentists, physicians, oculists, etc., are required to pay a $10 yearly license fee.

Bills not enacted: H. 120 provided for a complete system of workmen's compensation. This bill was particularly interesting from the dental point of view because it provided that the employer should replace all natural and artificial teeth or bridgework damaged during employment to the extent of $500. Very few state workmen's compensation laws specifically mention dental services, although most states do provide care for such injuries. H. 552 made provision for necessary medical, dental and other treatment for children up to 16 years of age without private funds or resources. H. 588 dealt with privileged communications made to physicians and surgeons.

NEBRASKA
Special Session, Adjourned January 13

No dental legislation reported.

NEW JERSEY
Recessed July 2 to November 12

Bills enacted: Senate 108 authorizes formation of non-profit medical service corporations operated for the benefit of subscribers. Business may not be conducted in counties where less than 51 per cent of the physicians are not participants.

Bills introduced: Assembly 59 provides tenure for medical inspectors, physicians and dentists in the public school system. A. 372 amends the present dental law to make it possible for the board to revoke the license of any dentist who has been employed by an unlicensed manager or proprietor and revises the definition of dentistry and exceptions to the definition. (Passed by House.) A. 441 provides for the licensing and control of all dental clinics by a board (presumably the state dental board). Industrial clinics are required to pay a $25 license fee. A. 457 permits municipal employes to participate in hospital service plans. (Passed by House.)

NEW YORK
Adjourned March 30

Bills enacted: Senate 59 (A. 24) increases the number of members on the commission appointed to study the health of inhabitants of the state. S. 927 (A. 1399) amends the medical practice act with respect to examinations for licensure. S. 929 (A. 1530) prohibits the construction of dentures, bridges or other appliances except on the written prescription of a licensed dentist. It also strikes out the provision for a practical examination of persons who have lawfully practiced for twenty years in other states. This bill also provides for not less than four or more than six inspectors to

investigate violations of the dental law. S. 1799 (A. 2175) authorizes the insurance commissioner to issue a permit to a corporation organized to furnish medical and dental expense indemnity for students who have been injured in athletic contests. S. 1925 permits state aid for laboratories established by county boards of supervisors. A. 1661 (S. 1400) requires a physician to submit frequent reports to the employer and industrial commission concerning the progress of the employes whom the physician is treating. A. 1763 (S. 1408) extends the period of time for the state health commission to study the health of the people of the state. A. 1806 (S. 1451) provides that the determination as to the medical care necessary for any person applying to public welfare officials shall be made with the advice of a physician. A. 2137 (S. 1686) exempts from jury duty dentists having patients requiring daily professional attention.

Bills not enacted: S. 167 proposed to eliminate from the Workmen's Compensation Law the provision permitting the carrier to select the physician for examination of injured employes. S. 315 (A. 798) provided that injured employes, when dental care was required, could select any dentist authorized by the Workmen's Compensation Commissioner on recommendation of the dental society. The bill also added three dentists to the industrial council to advise the commissioner. S. 508 (A. 695) defined the practice of radiology and prohibited its practice except by persons licensed under the law. S. 1239 provided for dental treatment and care of employes and for workmen's compensation dental bureaus. S. 1395 (A. 2268) provided for health service for vocational school supplies. S. 1445 (A. 1812) provided for a system of compulsory health insurance and voluntary insurance of those not covered by the act.

A. 469 proposed the establishment of a state wide plan of public medicine establishing four divisions, medical, dental, nursing and pharmacy, with jurisdiction over the health functions of various departments. The ultimate goal of the health department would be to render complete medical care, free of charge, to all state residents. A. 502 proposed the establishment of a commission to study dental needs and formulate a long range dental program. A. 1339 proposed the provision of medical treatment and care in order to render unemployed persons employable. Provision of dental care was not mentioned specifically in the bill. A. 2017 proposed an amendment to the public welfare law to permit persons entitled to home relief to select their own physicians or dentists. A. 2039 proposed an increase in the county registration fees for licenses to practice medicine, dentistry and veterinary medicine.

PENNSYLVANIA
Special Session, Adjourned May 16

No dental legislation reported.

RHODE ISLAND
Adjourned April 24

Bills enacted: Senate 7 enacts a basic science law which provides that no person shall take any of the healing arts licensing examinations unless he has passed an examination in the basic sciences. This examination is to cover anatomy, physiology, pathology, symptomatology, chemistry, bacteriology and public health. All applicants must be citizens of the United States or must have obtained their first papers. H. 973 amends the 1939 social welfare law, including a definition as to when a person is to be considered medically needy.

Bills not enacted: Senate 70 proposed the enactment of a law defining and regulating the practice of naturopathy. S. 131 proposed giving a first lien to medical practitioners for service rendered to persons injured in accidents. H. 658 proposed the adoption of a system of compulsory and voluntary health insurance. This bill was the same as the one entered in 1939.

SOUTH CAROLINA
Adjourned June 8, 1940

No legislation reported.

VIRGINIA
Adjourned March 23

Bills enacted: Senate 253 permits the formation of non-profit medical or hospital service plans under the control of the state corporation commission. Joint Resolution No. 28 appoints a five-man commission to study adequacy of and ways of improving existing health programs in rural areas of the state. The commission is authorized to call upon any health agencies, medical or dental associations, boards of health or other agencies deemed capable of assisting it.

DENTAL ECONOMICS

THE MISSOURI PLAN

By PAUL F. O'BRIEN, D.D.S., St. Louis, Mo.

ORDINARILY, a satisfactory explanation has been made when the following questions have been answered: "Why is it, what is it, how does it operate and does it serve the purpose intended?" In the effort to explain the Missouri Plan briefly, an attempt will be made to answer those questions.

WHY WAS THE MISSOURI PLAN DEVISED?

The first duty of the dental profession is to serve the people. Whether or not the profession is of the opinion that the system it has established can accomplish this purpose, it is forced to admit that an overwhelming number of people are not obtaining needed dental treatment. This fact alone, regardless of the controversial factors involved, should stimulate the profession to action.

The threat of compulsory health insurance held over the medical profession (and over the public) may stampede that profession into inaugurating a voluntary health insurance program. And that such insurance will affect the standard of dental service adversely can hardly be questioned. Whether medical care can be rendered equitably under an insurance plan is quite controversial. That reasonably complete dental care cannot be rendered similarly is apparent to those who understand the nature of dental service. Life insurance cannot be bought *after* death occurs; fire insurance cannot be bought *after* the fire occurs, and accident insurance cannot be bought *after* the accident occurs. By the same token, is it logical to assume that dental care insurance could be bought *after* the need arises? Will it be required that the applicant first becomes dentally insurable? If the answer is yes, then *why* the insurance? If the answer is no, then *how* the insurance?

Notwithstanding that medical care by its nature may be adaptable to the insurance principle, the case against compulsory health insurance is a strong one. Since complete dental care, owing to its nature, is less adaptable to the insurance principle, the case against compulsory dental insurance is indeed doubly strong. Of voluntary health insurance, it may be asked: Can those of the low-income brackets, for whom the insurance is specifically intended, be induced to join? Can they meet the premium require-

Read before the La Salle County (Ill.) Dental Society, October 5, 1939.

ments, if heretofore (as argued) they have had no money with which to buy health care? Since such persons made no provision during the past for health care, by what method of reasoning can they be expected to provide for premium requirements in the future? Can health insurance in some mysterious way change the tendencies of human nature? If health insurance, compulsory and voluntary, is ruled out, what alternative can be offered?

It is obvious that many persons suffer from dental neglect owing to lack of dental health education. It is also thought that the most effective approach to the dental health educational problem can be made through the medium of a personal demonstration to the individual that preventive-restorative measures are conducive to comfort and good health. The Missouri Plan is an effort to answer this phase of the dental health problem.

It is known that many persons suffer from dental neglect owing to financial limitation. To call attention to the fact that such financial limitation is due, in many instances, to injudicious use of income is unsound psychology, even though it is true. If the profession would maintain a favorable public opinion, it must accept the limitations of human nature and not stand aloof in criticism of a condition that has become natural, and which it is powerless to change.

WHAT IS THE MISSOURI PLAN?

The Missouri Plan is a plan that offers low-wage and indigent families an opportunity to obtain needed dental treatment in accordance with their ability to pay. It is a medium of dental health education through which interest in dental health is aroused, not only on the part of low-wage and indigent persons, but also on the part of the more affluent. It offers the profession an opportunity to build favorable public opinion, an opportunity to discharge its implied obligation to those whom it has not heretofore reached through established educational facilities. It relieves the practitioner of the difficult and uncertain task of determining the exact social or financial status of the low-wage earner. It is the State of Missouri's answer to the threat of external interference.

PRINCIPLES

The Missouri Plan is built on the following principles:

WHEREAS the members of the dental profession again acknowledge their professional obligation to the public, and recognize that many individuals are suffering from dental neglect owing to (1) lack of dental health education and (2) financial limitations; and

WHEREAS the profession realizes that the most effective approach to the dental health educational problem can be made through the medium of a personal demonstration to the individual that prophylactic-restorative measures are conducive to comfort and good health; and

WHEREAS the loss of self-administration in matters pertaining to the profession may, in the ultimate, prove inimical to public welfare and also retard professional progress; therefore, be it

Resolved that the members of the dental profession volunteer to render needed dental treatment to indigent and low-income families on terms within the financial limits of such families, a course of action which will simultaneously advance the cause of public dental health education.

HOW DOES THE MISSOURI PLAN OPERATE?

The following basic rules of procedure have been adopted, but remain subject to broad interpretation as practical experience requires.

1. A bureau shall be established by, and remain under control of, the local dental society. The function of this bureau shall be to act as intermediary between the dental profession and those

persons who apply for dental treatment. More specifically, the bureau shall: (a) list the names of cooperating dentists, (b) stimulate the public to act, (c) conduct the social survey, (d) refer the patient to the dentist, (e) administer the funds and (f) keep statistical records.

2. (a) Full information shall be conveyed to the family social agencies and selected employers that those individuals who believe themselves unable to finance needed dental care may, upon application to the bureau, submit to a social survey and obtain treatment on such terms as may be deemed reasonable and fair by themselves and the bureau, in agreement with the dentist of the individual's choice. (b) Later, when the practicability of the plan has been demonstrated, this information shall be conveyed to the public at large.

3. In order not to undermine the patient's evaluation of dental treatment, payment shall not be designated a "fee" for a specific service, but shall be accepted only as a contribution to a general fund from which dental treatment for the low-income person will be provided.

4. It shall, of course, remain the privilege of the dentist to conduct his practice with no interference or restriction whatever. Patients who consult him directly, regardless of their financial circumstances, may be served at his discretion. (Attention is called to the possibility that a social survey where indicated may minimize unwarranted fee reduction and thereby help maintain the usual fee scale of each practitioner in the routine of his private practice.)

5. Patients applying for treatment shall always be classified according to their ability to pay. While the type and extent of service needed will play some part, the primary consideration shall always be the patient's ability to pay. In all cases, he shall receive the treatment needed to insure good health, comfort and personable appearance, to be determined in consultation between himself and his dentist.

6. Free choice of dentist shall at all times prevail, except that, in the disposition of those who can contribute nothing, it may be necessary to exercise some control in order to maintain a favorable balance between "pay" and "no-pay" cases in the instance of each practitioner.

7. Should an individual have no family dentist, the bureau shall not recommend a specific dentist, but shall submit the names and addresses of all practitioners who have agreed to cooperate. If requested, the bureau may direct attention to those practitioners located near the patient's home or place of employment.

8. The dentist of the patient's choice shall be consulted in advance regarding the classification of the patient.

9. The dentist may, at his discretion, agree or refuse to serve in any particular instance, and he may, of course, withdraw his agreement to cooperate at any time. If dissatisfied with a survey made in the bureau, the dentist may request that the survey be reviewed by the Advisory Committe.

10. The dentist shall receive remuneration equal to the sum contributed by the patient less the prorated administrative expense, which in no single case shall exceed 10 per cent of the sum contributed.

11. Any ethical dentist, whether or not a member of organized dentistry, may cooperate upon signing the agreement certificate provided for such purpose.

12. The bureau, in regard to the foregoing rules of procedure, shall be under the control of an advisory committee consisting of five members, who shall be selected from among and by the cooperating group of dentists.

The Missouri Plan functions as follows: The individual is referred directly to the bureau by a social agency; by an employer who has been authorized to refer him, or by a dentist, physician or an-

other patient. Upon the first visit, a preliminary social survey is made and the family dentist is consulted as to whether he will see the patient. (If the individual has no family dentist, a list of names of those located near his home or place of employment is submitted.) An appointment is arranged with the dentist of the patient's choice. The dentist completes the examination and records the service needed and the fee usually charged. The examination card is returned to the bureau. In the meantime, the social survey is completed through the aid of one or more of the following: employer or personnel manager, social agency, various reference facilities, previous employer, credit bureaus, previous dentist or physician, dentist now selected, neighbors and personal references. Upon return to the bureau, the patient is classified according to his ability to pay. This classification is made by the trained personnel of the bureau in agreement with the patient. The dentist is informed regarding the patient's income, current and long-term obligations, family responsibilities and credit rating. The dentist then agrees or refuses to serve the patient under the conditions found by the bureau. Upon acceptance by the dentist, the patient signs an agreement and an appointment is arranged.

That the dentist is requested to accept the findings and recommendations of the bureau does not mean that he has no voice in the matter or that he is under the dictation of the bureau. The patient's financial circumstances determine the amount to be contributed. It is felt that the bureau with its trained personnel can more correctly interpret the patient's financial circumstances than can the dentist. Once a survey is made carefully and intelligently, the sum to be contributed by the patient is a matter of common sense and seldom becomes controversial. However, if a survey does not meet with the approval of the dentist, he may (1) refuse to serve that particular patient; (2) request that the survey be reconducted; (3) request that the case be referred to the Advisory Committee for review, or (4) conclude his own arrangements with the patient.

It is not necessary for the dentist and the patient to enter into a discussion regarding money. All arrangements are made by, and payments are made to, the bureau. The patient is made to understand that money paid is not to be considered a "fee" for a specific service, but a contribution to a fund. Should the patient then refer a friend to that dentist for a similar service, he may freely quote his usual fee without fear of undue reaction. If the second patient objects to the fee quoted, the dentist may hold to that fee or request the patient to submit to a social survey. Upon completion of a case or failure of the patient to return for completion, a "service card" is returned to the bureau for statistical purposes.

HAS THE MISSOURI PLAN BEEN WORTH WHILE?

Whether the Missouri Plan will "work" is no longer controversial. It does work, beyond a doubt. That it is a complete and final answer to the sociodental problem is, of course, not possible. The solution of a social problem cannot be complete or final in a society that is itself never complete or final.

The Missouri Plan has been in actual operation for a period of about ten months, during which time it was held "under blankets," so to speak, for it was decided to proceed slowly and cautiously until the plan either proved or failed to prove itself. The following conclusions have been drawn from the experience thus far:

1. The plan is practical and sound.
2. It has been accepted by the employee in direct proportion to the leadership and enthusiasm manifested by the dental profession.
3. It has been enthusiastically re-

ceived by employers, social agencies, newspapers and civic-minded persons.

4. It has been accepted favorably by 90 per cent of the local practitioners.

5. It does not disturb the routine of private practice.

6. It has not affected the private fee scale.

7. It can be kept under the complete control of the profession, and therefore safeguards the autonomy of the profession.

8. It permits control of the number of applicants referred by both social agencies and the employer.

9. It does not commit the profession to a policy which later may be held against it.

10. It has had a greater response from those who can pay a reasonable sum than from the outright indigent; which seems to indicate that lack of money is not of primary importance.

11. It has proved that relatively few persons wish to be served gratis.

12. It is adaptable to changing economic conditions without reaction, because its degree of activity is regulated by such changing conditions.

13. It advances the cause of dental health education and promotes favorable public opinion.

14. It does not retard technical progress, since the practitioner has an incentive to render his best service, because a person in the low-wage group may not always be of that class, and, moreover, if pleased, may refer an acquaintance of affluence.

15. It has taught not a few persons the wisdom of using their money for health purposes. It has also clarified the respective responsibilities of the public and the profession in the minds of many persons. It has helped to awaken the profession to a recognition of its social responsibilities.

16. It allows the dentist freedom in professional judgment.

17. It involves no compulsion.

18. It precludes the fixation of fees or rates.

19. It permits free choice of dentist and patient.

20. It provides service within the financial limits of the low-income and indigent groups—those whom compulsory dental service insurance would affect.

21. Collection experience thus far has shown that approximately 92 per cent of monies budgeted are paid.

22. It is dignified, upholds professional tradition and safeguards the personal relationship of dentist and patient.

23. Social agencies do not expect the profession to render service gratis, and therefore such agencies make some payment for services rendered their clients.

24. It has not been construed as a charity program by layman or social agency.

25. It maintains an equitable relationship between patient and dentist. (After all, it is not equitable to exact a fee that is clearly beyond the patient's ability to pay.)

26. It reduces the chances that the patient may take unfair advantage of the practitioner's generosity.

27. It keeps dental service in the private office, where the majority of dentists agree it belongs.

28. No applicant eligible to receive treatment under the plan has objected to a survey of his social status. No doubt many persons have failed to apply owing to such objection; but since no stigma of "charity" is attached to the program, it is thought that such persons may in time be educated to a more realistic sense of values.

29. That the applicant contributes according to his ability to pay and not according to a fee scale set by the practitioner, and the practitioner does not receive the entire contribution, justifies the statement that "the patient contributes to a fund."

Under the Missouri Plan in St. Louis, approximately 600 low-wage earners and

indigent persons have been served and approximately 500 other persons of greater affluence have been advised to deal directly with their family dentists. In addition, many of those served through the plan have referred other patients directly to the dentist, without the aid of the bureau. Many patients have made their own arrangements with the dentist, even though they originally selected that dentist from the list presented by the bureau. It is, of course, the dentist's privilege to deal with the patient directly, and not make use of the bureau, if he wishes, even though the patient is sent to him through the bureau. That a greater number have not applied for treatment is no barometer of public acceptance, for the number could have been ten times greater had the Advisory Committee not decided to proceed cautiously.

The family social agencies and about thirty industries employing 8,000 persons have been contacted since the news releases appeared in the St. Louis newspapers. Approximately 2,500 low-wage employes have been addressed by a representative of the profession. In each instance, the employer was given a thorough understanding of the program, and, without exception, he reacted most favorably. All but one employer asked for inserts to place in pay envelopes. That one exception will develop a complete health program for his employes within a short time, and has intimated that the Missouri Plan will be incorporated in that program.

A firm employing 3,000 low-wage earners had under consideration a contract arrangement to provide dental care for its employes. It was at the invitation of the personnel director that the Missouri Plan was explained. His own words were "This move on the part of the dentists of St. Louis renews my faith in the professions." Additional information has been given to the board of directors of this firm, and negotiations are well under way wherein the employes of this firm will be directed to their family dentists through the Missouri Plan. It is indeed significant that the profession has made available a representative agency through which that personnel director can be advised without delay or equivocation. More significant perhaps is the fact that a practical and all-inclusive plan to provide care for the low-wage employes is in actual operation and available to this firm. It requires no great imagination to recognize the advantage of a plan in fact over one of theory in negotiating with an industrial group.

A case referred by a social agency was that of a woman who could contribute nothing. Dentures were made for her and in appreciation she has referred three other low-wage earners to that dentist. The contributions agreed upon totaled $177, of which $40 was paid each month. In addition, four private patients were referred to this dentist direct.

One person accepted as an indigent was unemployed and responsible for the support of a wife and a 9-months-old baby. The needed service was rendered with no remuneration to the dentist. The patient later secured a WPA job and returned to the bureau with an offer to pay.

A firm referred an employe whose irreducible expenses equaled his income. Notwithstanding, he agreed to contribute $2 a month on a $40 contract. After a telephone conversation with his employer, it was agreed that the patient could actually contribute nothing. Whereupon the employer volunteered to pay the account in full without condition. The patient was served, the dentist received payment in advance and the employer has shown that he is alive to the sociodental needs of the community.

A dentist referred a patient to the bureau for a survey. His regular fee for the service needed was $145. The patient had saved $50 with which to obtain

treatment. It was agreed by the patient, the dentist and the bureau that payment of $90 under the circumstances would be fair. Thereupon, the patient immediately paid the dentist the $50 and agreed to pay the balance within several months. Thus, the dentist was able to serve a worthy patient without jeopardizing his private fee scale.

A request for information was received from a firm employing 1,500 persons, few of whom earn less than $2,000 a year. It was evident that only an occasional member of this group would be eligible under the Missouri Plan, but all were eligible to be served through the budget arrangement of the bureau, and certainly all were potential patients. The group was addressed by a representative of the profession and a number of them have since sought treatment in the conventional private manner. Serving the less fortunate according to professional tradition has stimulated interest in dental health on the part of the more affluent. This fact has been demonstrated beyond dispute and implies neither a subterfuge nor selfish advertising. Certainly, the profession is entitled to some reward for relieving the community of one of its socio-economic problems. Civic leaders, business men and popular opinion will acknowledge that the profession cannot continue to render a costly service at little or no compensation unless such effort is counterbalanced by an increase in remunerative cases—or it is subsidized.

No applicant, regardless of financial circumstances, has been denied needed service. The relatively small number of patients applying for service is not at all discouraging. It must be remembered that the plan is dealing with the 80 per cent of the population whom heretofore the profession has failed to interest in dental health. The great need for dental public health education is again vividly demonstrated.

The assertion has been made that the Missouri Plan is idealistic and impractical. After all, a bit of idealism is necessary; for what great good has come into the world without the inspiration of a certain measure of idealism? The impractical idealists are those who sit complacently and trust that "everything will turn out all right" of its own accord. The situation the profession finds itself in today is due to such smug idealism. The Missouri Plan is realism. It is no longer theory, but fact. The assertion that it "won't work" is misapplied because it is working, and it can no doubt be made to work equally well elsewhere.

People are the same everywhere, and dentists are the same everywhere. The only variable is in direction and activity of local leadership. Given an identical leadership, the response in any city, county or state will be fundamentally the same.

If the profession assumes the leadership and takes the initiative, the community may respond and thereafter may continue to look to the profession for leadership. On the other hand, if the community is obliged to take the initiative, it may take control. It must be remembered that not one fraction of administrative responsibility can be relegated to others without a corresponding surrender of privilege and control. It is possible, however, that the community may recognize the advantage of underwriting the administrative expense of an organized dental service program once the profession demonstrates the practicability of such a program. Thus far, the Missouri Plan in St. Louis has depended on the 10 per cent deducted from the payments made by the patients and on private subscription among the practitioners to meet the administrative expense.

Surely, leadership can somehow develop the educational potentialities of a community if the future health and happiness of that community depend primarily on such development. Therein

lie a responsibility and an opportunity for the profession. Industry, political parties, governments and even religions prosper in direct ratio to the efficacy of their leadership in solving social problems. Why should the health profession fare better or easier than they?

The charges against the professions today may, on the surface, seem to involve the money factor primarily, but analysis will reveal that those charges are also founded on a suspicion that the professions are deficient in civic consciousness. Perhaps, after all, the public is justifiably disappointed that professional men, privileged by law to enjoy self-administration, have failed to completely accept the social responsibility such privilege implies. Therefore, the threat to withdraw that privilege arises, and no power can long defer such withdrawal other than that power which resides within the professions themselves.

It is perhaps safe to state that the Missouri Plan has not only made it possible for many worthy persons to receive treatment, but also has increased the practice of not a few young practitioners, and, perhaps of greater importance, has given conclusive evidence that the profession is not oblivious to its social obligation to the community.

702 Missouri Theatre Building.

MOBILE DENTAL UNITS FOR RUMANIA

SEVENTY-TWO fully equipped mobile dental units were recently shipped by an English firm to the Rumanian government for operation among the scattered population of the rural areas.

These mobile clinics are of the caravan trailer type, designed for towing behind a private car of moderate horsepower, and are similar in appearance and general arrangement to those in commission with several of our own school dental services.

The Rumanian trailers are intended as much for the treatment of adults as of children and their design includes a fitted dental workroom. Mechanical work, even to the provision of dentures, can be undertaken, in addition to operative treatment. Each unit can, in fact, provide complete dental service many miles from its base.

The trailers are light, well-ventilated and insulated against heat and cold. Careful planning of the interior has resulted in the provision of adequate space in the surgery for operations to be carried out in conditions of comfort and convenience.—*Dental Record* (England).

PAYMENT OF DELEGATES' EXPENSES BY STATE DENTAL SOCIETIES

THE District of Columbia Dental Society recently conducted a survey to find out what provisions various states have made in respect to the expenses of Delegates to the A.D.A. Annual Meeting. The following questions were asked:

1. Do you pay all of their expenses?
2. Do you pay any part of their expenses?
3. Do you pay railroad and hotel expenses?
4. Do you pay so much per day for

attending sessions of the House of Delegates?

Replies were received from nearly all of the states. The nature of the replies is indicated below. Approximately one third of the states pay at least a part of the delegates' expenses, while two thirds of the states pay none.

SUMMARY OF DELEGATES' EXPENSES SURVEY

States Which Pay All Delegates' Expenses

Arkansas
Delaware
New Hampshire

States Which Pay Part of Delegates' Expenses

Connecticut: President and secretary.

Idaho: Grants specific sum to help defray expenses.

Illinois: President and secretary.

Indiana: $25 to delegates who attend all sessions.

Iowa: Pay railroad and hotel expense of chairman and delegation.

Maine: $5 a day at convention, $10 for travel.

Massachusetts: President's expenses only.

Minnesota: President, secretary, editor.

Michigan.

Montana: Railroad and Pullman expense of supervisor of clinics who is delegate.

New Jersey: Carfare, Pullman fare and $5 per day for each delegate.

New York: Part of expenses when meeting is west of Mississippi.

Rhode Island: President's expenses only.

Southern California: Railroad and hotel expenses of president and president-elect.

South Dakota: $25 to each delegate.

States Which Do Not Pay Any Part of Delegates' Expenses

Alabama
Arizona
California
Colorado
Florida
Georgia
Kansas
Kentucky
Louisiana
Maryland
Mississippi
Missouri
Nebraska
Nevada
New Mexico
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
South Carolina
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming
District of Columbia

GUGGENHEIM CLINIC TO EXTEND ITS SERVICE

ANNOUNCEMENT has been made by the Murry and Leonie Guggenheim Dental Clinic that it will equip and man an additional floor, heretofore unused, in the clinic building, 422-428 East Seventy-Second Street, New York, N. Y. This will mean adding twenty-eight new chairs to the forty chairs now in use, with corresponding increase in the number of patients who will be treated. The new chairs will be put into service in September 1940.

Announcement is also made of the extension of the course given by the School for Dental Hygienists conducted in the clinic. The course, which up to the present has been one college year in length, will be extended to one and a half years, beginning with the class entering in February 1941.

PRESCRIPTIONS FOR LABORATORIES REQUIRED BY NEW YORK LAW

THE State of New York passed this month a bill requiring all dentists to issue prescriptions to dental laboratories for the construction of artificial dentures, bridges, crowns, inlays and porcelain jacket crowns. To enforce the law, state investigators will be able to enter any laboratory and demand to see a prescription for every piece of work in the establishment. New York laboratories waged an unsuccessful fight to prevent this bill from becoming a law.

Another dental bill passed at the same time provides for the creation of five more state inspectors for a more thorough check-up throughout the state against unlicensed persons practicing dentistry.—*D. Lab. News,* May 1940.

COMMITTEE ON SURGERY OF THE NATIONAL RESEARCH COUNCIL

THE Sub-Committee on Plastic and Facio-Maxillary Surgery is working with the Committee on Surgery of the National Research Council, the purpose being to aid the Surgeons General of the Army and Navy in every way possible in formulating plans for taking care of various kinds of wounds in the event of war. The sub-committee members are: Robert H. Ivy, Philadelphia, Pa., chairman; Ferris Smith, Grand Rapids, Mich.; John Staige Davis, Baltimore, Md.; Joseph D. Eby, New York, N. Y.; P. C. Lowery, Detroit, Mich.; Gen. Raymond Metcalf, U. S. Army; Gen. Leigh C. Fairbank, U. S. Army, and Col. Roy A. Stout, Walter Reed General Hospital, Washington, D. C.

The first meeting was held at Walter Reed General Hospital, Washington, D. C., June 29.

ANNOUNCEMENT OF A STUDY TO EVALUATE ORIGINAL SEROLOGIC TESTS FOR SYPHILIS

MORE than five years ago, the Committee on Evaluation of Serodiagnostic Tests for Syphilis, in cooperation with the United States Public Health Service, conducted a study to evaluate original serologic tests for syphilis or modifications thereof in the United States. The results of this study were published shortly after the investigation was completed.[1]

Consideration is now being given by the committee to the organization of a second evaluation study of original serologic tests for syphilis or modifications thereof within the next year. If the need for an investigation of this kind seems to justify the cost, invitations will be extended to the authors of such serologic tests who reside in the United States or who may be able to participate by the designation of a serologist who will represent them in this country. The sec-

1. *Ven. Dis. Inform.,* 16:189, June 1935. *J.A.M.A.,* 104:2083, June 8, 1935.

ond evaluation study will be conducted, utilizing methods comparable to those employed in the first study.[2]

Serologists who have an original serologic test for syphilis or an original modification thereof and who desire to participate in the second evaluation study should submit their applications not later than October 1, 1940. The applications must be accompanied by a complete description of the technic of the author's serologic test or modification. All correspondence should be directed to the Surgeon General, United States Public Health Service, Washington, D. C.

2. *J.A.M.A.*, 103:1705, December 1, 1934.

MEMORIAL ISSUE OF ARCHIVES OF CLINICAL ORAL PATHOLOGY

FOR GEORGE B. WINTER

A SPECIAL memorial issue to the late George B. Winter is planned by the *Archives of Clinical Oral Pathology* for September 1940. The issue will contain articles contributed by Dr. Winter's friends and students on the subject of the impacted third molar. These will deal with the clinical, embryologic, anatomic, pathologic and roentgenologic viewpoints. Editorial and historical contributions will also be presented.

Inquiries concerning the memorial issue should be addressed to Theodor Blum, 30 Rockefeller Plaza, New York, N. Y.

FIRST AMERICAN DENTAL AMBULANCE SENT TO ENGLAND

EARLY in May, the first dental ambulance to be sent to Europe by American dentists was shipped to England. Three weeks later, a check for $1,000 was cabled to the British dental profession to equip this ambulance as an emergency operating room where injuries of the face and jaw inflicted on civilians during air raids can be given immediate care. Both the ambulance and the check are gifts to British dentists from the American dental profession.

The ambulance has a special body built on a Mack truck chassis and is called the "American Dental Ambulance." It will be manned by a general surgeon, a dental surgeon, a dental mechanic and an anesthetist and is equipped to give preliminary splinting and early care of the wounds of the face and jaws. Members of the staff will be selected in England by Sir Harold Gillies, director of maxillofacial service for the Ministry of Health Emergency Hospital Service, with headquarters in London. He will be assisted in direction of the emergency service by Dr. Kelsey Fry, of Guy's Hospital.

Experience gained through the last war is guiding these men in planning the most efficient service possible. Great advances made during the first World War in the treatment of the injuries of the face and jaws were partly the result of cooperation of the dental surgeon and the plastic surgeon. At times, however, it was impossible to obtain good operative results in the reconstruction of facial

injuries unless the bones of the face and jaws were accurately held in place by well-constructed splints. Although cleverly designed appliances and plastic surgery did much to restore to normal shattered faces that otherwise could not have been repaired, it was found of the utmost importance to give patients with such injuries as early treatment as possible. Some months ago, it was learned in New York that Sir Harold Gillies, eminent plastic surgeon, needed a mobile unit in order to carry on this special work in and around the London area.

On discovering that there were not enough centers for the treatment of jaw and facial injuries, Sir Harold conceived the idea of having an ambulance equipped with a dental laboratory with all sorts of appliances, such as facebows, head gears, chin cups and splints to immobilize shattered parts of the face that were injured during air raids and in the heavy fighting in the army, navy and air services, which is now taking place overseas and is expected to continue for some time to come.

Many oral and dental surgeons in this country, upon hearing of this need in England, formed a committee to obtain funds for an ambulance to be presented to the British professions. Included in this committee are professional men of New York, Philadelphia, Boston, Washington, Baltimore, Chicago and Cleveland, as well as men on the West Coast. The executive committee is composed of Arthur H. Merritt, Harry M. Moss, Oscar J. Chase, Martin C. Tracy, Lewis K. Mobley, Benjamin S. Barringer, attorney, and Henry S. Dunning, secretary, New York City.

FREDERICK B. NOYES TO BE HONORED

FREDERICK B. NOYES, retiring dean of the University of Illinois, College of Dentistry, September 1, will be honored at a testimonial banquet on the evening of September 14. Because of the prominence of Dr. Noyes in organized dentistry, dental education and dental research, this occasion promises to be outstanding. The banquet, which is sponsored by the faculty of the University of Illinois, College of Dentistry, will be held at the Lake Shore Athletic Club, Chicago, the Saturday following the American Dental Association meeting in Cleveland. This date was chosen to make it possible for those attending the A.D.A. meeting to come to Chicago to join in honoring Dr. Noyes.

For further information or reservations, address Allan G. Brodie or Stanley W. Tylman, 808 South Wood St., Chicago.

AMERICAN DENTAL ASSOCIATION EIGHTY-SECOND ANNUAL MEETING

CLEVELAND, OHIO, SEPTEMBER 9, 10, 11, 12, 13, 1940

OFFICIAL CALL

To the Members of the American Dental Association:

You are hereby notified that the Eighty-Second Annual Meeting of the American Dental Association will be held in Cleveland, Ohio, September 9-13, 1940.

The House of Delegates will convene at 10:00 a.m., Monday, September 9. The second session will be held at 2:30 p.m., Monday, September 9; the third session at 2:30 p.m., Wednesday, September 11, and the fourth session at 2:30 p.m., Thursday, September 12. The four sessions of the House of Delegates will be held in the Euclid Ballroom of the Hotel Statler. The Credentials Committee will register Delegates and Alternates, beginning at 10:00 a.m., Sunday, September 8, at the Hotel Statler.

All other members will register at the Registration Office in the Public Auditorium. The Registration Department will be open from 9:00 a.m. to 5:00 p.m., Sunday, September 8, and Monday, Tuesday, Wednesday, Thursday and Friday, September 9, 10, 11, 12 and 13.

The General Session which constitutes the opening exercises of the Meeting will be held Tuesday, September 10, at 9:30 a.m. The second and third General Sessions will be held Tuesday and Thursday evenings, September 10 and 12, at 8:00 p.m. The three General Sessions will be held in the Music Hall of the Public Auditorium.

The constituent societies are notified to file with the Secretary of this Association, at least thirty days prior to the first day of the Annual Meeting, a list of the names and addresses of their Delegates and Alternates.

ARTHUR H. MERRITT, *President.*
HARRY B. PINNEY, *Secretary.*

COMMITTEE ON LOCAL ARRANGEMENTS, EIGHTY-SECOND ANNUAL MEETING OF THE AMERICAN DENTAL ASSOCIATION, CLEVELAND, OHIO, SEPT. 9-13, 1940

GENERAL PROGRAM

Registration (General).....Sunday, September 8, 9:00 a.m.
(Auditorium)

Registration (Delegates and Alternates).....Sunday, September 8, 10:00 a.m.
(Euclid Ballroom, Hotel Statler)

Board of Trustees (First Meeting).....Friday, September 6, 10:00 a.m.
(Hotel Statler)

Board of Trustees (Second Meeting).....Saturday, September 7, 10:00 a.m.
(Hotel Statler)

House of Delegates (First Meeting).....Monday, September 9, 10:00 a.m.
(Euclid Ballroom, Hotel Statler)

House of Delegates (Second Meeting).....Monday, September 9, 2:30 p.m.
(Euclid Ballroom, Hotel Statler)

House of Delegates (Third Meeting).....Wednesday, September 11, 2:30 p.m.
(Euclid Ballroom, Hotel Statler)

House of Delegates (Fourth Meeting).....Thursday, September 12, 2:30 p.m.
(Euclid Ballroom, Hotel Statler)

PRELIMINARY PROGRAM FOR THE CLEVELAND MEETING

FIRST GENERAL SESSION

(Music Hall, Auditorium)

TUESDAY, SEPTEMBER 10

9:30 a.m. Music
J. S. Oartel, organist.....Wilkinsburg, Pa.

9:45 Invocation
Rev. Dilworth Lupton,
First Unitarian Church.....Cleveland, Ohio

9:50 Address: "General Health Legislation"
James E. Murray, Senator from Montana

10:30 Address: "The Art of Living"
Rev. Norman Vincent Peale.....New York, N. Y.

11:15 Introduction of foreign guests

11:30 Address by the President
Arthur H. Merritt.....New York, N. Y.

SECOND GENERAL SESSION

(Music Hall, Auditorium)

TUESDAY, SEPTEMBER 10

8:00 p.m. Music

8:15 Address: "Our Views and the Hour's News"
Frederic Snyder.....Kingston, N. Y.

THIRD GENERAL SESSION

(Music Hall, Auditorium)

THURSDAY, SEPTEMBER 12

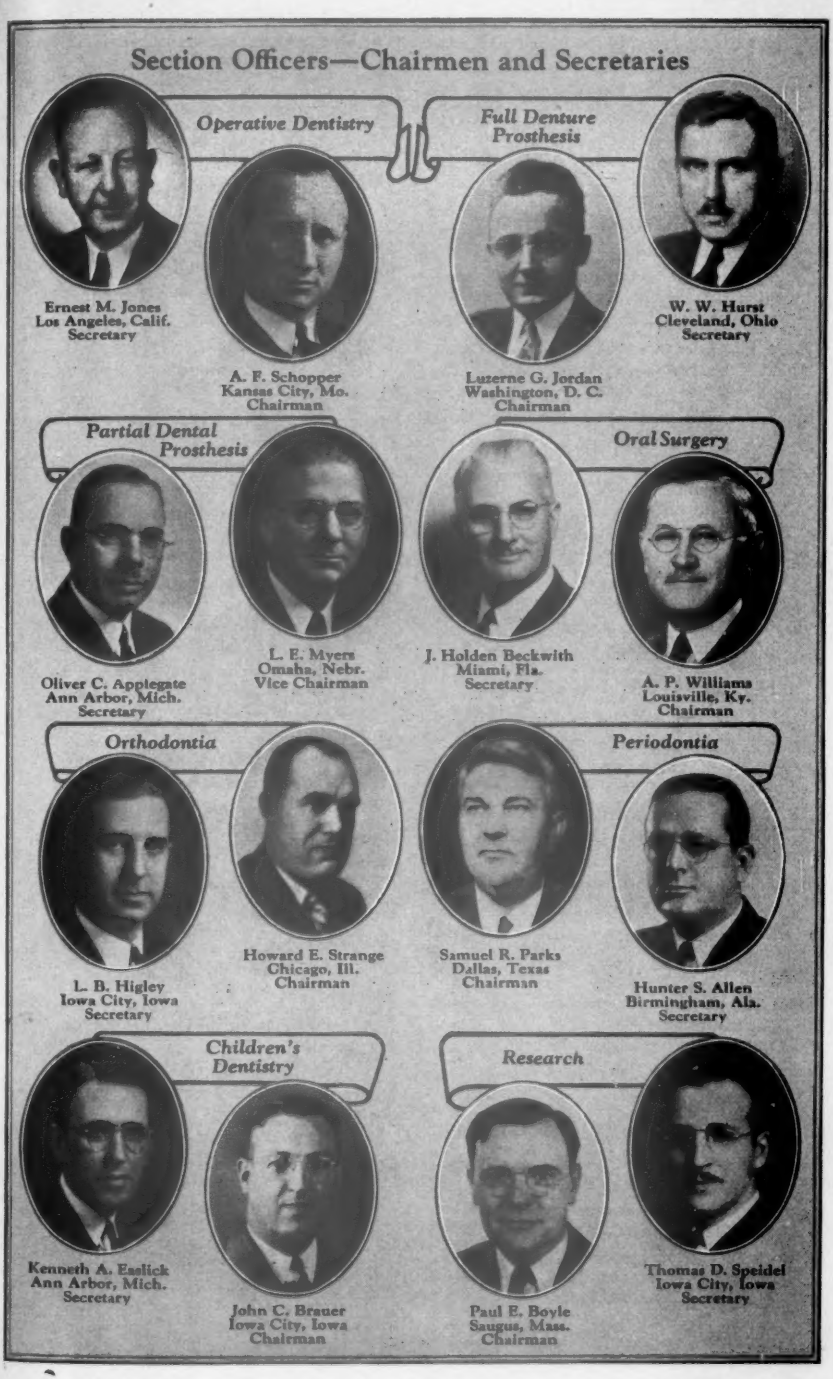
8:00 p.m. Music

8:15 Address: "An Anthropologist Ruminates on Dentition and Devolution"
Earnest Albert Hooton, Ph.D., Sc.D.....Cambridge, Mass.

DENTAL HEALTH WEEK DURING CENTENNIAL CELEBRATION

APPRECIATIVE of the contribution which dentistry has made to humanity during the past one hundred years, the executive officers of the host state of Ohio and the host city of Cleveland have proclaimed the week of September 8 Dental Health Week.

Copies of the two proclamations, one signed by Governor John W. Bricker and the other by Mayor Harold H. Burton, are published in this issue. The Local Arrangements Committee in Cleveland are cooperating with Governor Bricker and Mayor Burton in planning a statewide educational program which will bring the proclamations to the attention of every Ohio citizen.



CHAIRMEN AND SECRETARIES OF THE SCIENTIFIC SECTIONS OF THE AMERICAN DENTAL ASSOCIATION, 1940

THE SCIENTIFIC SECTIONS

TUESDAY AFTERNOON, SEPTEMBER 10

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Public Auditorium—South Hall A)

OFFICERS OF SECTION

A. F. Schopper, Chairman.....
.....Professional Bldg., Kansas City, Mo.

Willard F. Andes, Vice Chairman.....
.....Huntington Bldg., Miami, Fla.

Ernest M. Jones, Secretary.....
.....122 E. 16th St., Los Angeles, Calif.

2:30 to 5:00 p.m.

2:30 "Porcelain Inlay Using the Direct Technic" (Illustrated with colored slides)
Nye White Goodman. Los Angeles, Calif.

3:15 "A Rational Technic for Amalgam Restorations"
K. Paul Ramsay.....London, England

4:00 "Cavity Preparations in Relation to Histologic and Biologic Principles"
Charles F. Bodecker...New York, N. Y.

FULL DENTURE PROSTHESIS

(Public Auditorium—Ballroom)

OFFICERS OF SECTION

L. G. Jordan, Chairman.....
..3505 Rodman Street, Washington, D. C.

G. E. Tilton, Vice Chairman.....
...Union Nat'l Bank Bldg., Wichita, Kan.

W. W. Hurst, Secretary.....
.....2165 Adelbert Rd., Cleveland, Ohio

2:30 to 5:00 p.m.

2:30 "Increasing the Possible Denture Foundation Area by Surgical Means"
V. Clyde Smedley.....Denver, Colo.

3:15 "Diagnosis, Prognosis and Records in Full Denture Service"
O. M. Dresen.....Milwaukee, Wis.

4:00 "Occlusion in Complete Dentures"
David W. McLean...Los Angeles, Calif.

PARTIAL DENTURE PROSTHESIS

(Public Auditorium—Little Theatre)

OFFICERS OF SECTION

Lester E. Myers, Vice Chairman.....
.....Medical Arts Bldg., Omaha, Nebr.

O. C. Applegate, Secretary.....
.....216 S. State St., Ann Arbor, Mich.

2:30 to 5:00 p.m.

2:30 "Value of the Roentgen-Rays in Partial Denture Prosthesis"
L. R. Main.....St. Louis, Mo.

3:15 "Tissue Reactions Encountered in Partial Denture Prosthesis"
Balint Orban.....Chicago, Ill.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Public Auditorium—Music Hall)

OFFICERS OF SECTION

A. P. Williams, Chairman.....
.....Starks Bldg., Louisville, Ky.

Thomas Conner, Vice Chairman.....
.....Doctors Bldg., Atlanta, Ga.

J. Holden Beckwith, Secretary.....
.....Ingraham Bldg., Miami, Fla.

2:30 to 5:00 p.m.

2:30 "Treatment of Disease of the Antra of Dental Origin"
George W. Christiansen...Detroit, Mich.

3:15 "An Oral Surgeon's and a Pathologist's Study of Granulomata and Radicular Cysts"
Stephen P. Mallett.....Boston, Mass.

4:00 "Roentgenology in Relation to Oral Surgery"
LeRoy M. Ennis.....Philadelphia, Pa.

ORTHODONTIA

(Public Auditorium—Club Room B)

OFFICERS OF SECTION

Howard E. Strange, Chairman.....
.....2376 E. 71st St., Chicago, Ill.

Frank Lamons, Vice Chairman.....
.....478 Peachtree St., Atlanta, Ga.

L. B. Higley, Secretary.....
.....705 S. Summit St., Iowa City, Iowa

2:30 to 5:00 p.m.

2:30 "Rôle of the Orthodontist and the General Practitioner in the Treatment of Jaw Fractures"
Paul A. Risk.....Lafayette, Ind.

3:15 "A Cephalometric Study of Movements of the Mandible"
John R. Thompson.....Chicago, Ill.

4:00 (Title to come)
Richard A. Lowy.....Newark, N. J.

PERIODONTIA

(Public Auditorium—South Hall B)

OFFICERS OF SECTION

Samuel R. Parks, Chairman.....
.....Medical Arts Bldg., Dallas, Texas

Lynn A. Fonner, Vice Chairman.....
1100 E. Creighton Ave., Fort Wayne, Ind.

Hunter S. Allen, Secretary.....
.....Comer Bldg., Birmingham, Ala.

2:30 to 5:00 p.m.

2:30 "Periodontal Sepsis in Relationship to Systemic Disease"
Russell A. Sand.....Fargo, N. D.

3:15 "Biochemical and Nutritional Factors in Periodontal Disease"
W. M. Reppeto.....Dallas, Texas

4:00 "Modernized Technics in Surgical Periodontia" (A motion picture)
Olin Kirkland .....Montgomery, Ala.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Public Auditorium—South Hall C)

OFFICERS OF SECTION

John C. Brauer, Chairman.....
State University of Iowa, Iowa City, Iowa

Philip E. Blackerby, Jr., Vice Chairman..
.....420 Sixth Ave. N., Nashville, Tenn.

Kenneth A. Easlick, Secretary.....
..105 S. W. Trick Bldg., Ann Arbor, Mich.

2:30 to 5:00 p.m.

2:30 "Surgical Considerations in the Case of the Child Patient"
Ferdinand Griess .....Lincoln, Nebr.

3:00 "The Child's First Appointment"
Walter T. McFall.....Asheville, N. C.

3:20 "Secondary Dentin Formation in the Deciduous Teeth"
Ralph L. Ireland.....Lincoln, Nebr.

3:40 Discussion
Geneve G. Riefling.....St. Louis, Mo.

3:50 "Observations and Treatment of Gingivitis and Pyorrhea in the Child Patient"
Ralph M. Erwin.....Portland, Ore.

4:10 Discussion
J. S. Restarski.....Chicago, Ill.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Public Auditorium—Club Room A)

OFFICERS OF SECTION

Paul E. Boyle, Chairman.....
.....311 Central Street, Saugus, Mass.

Harold J. Noyes, Vice Chairman.....
....55 East Washington St., Chicago, Ill.

Thomas D. Speidel, Secretary.....
..State University of Iowa, Iowa City, Iowa

2:30 to 5:00 p.m.

2:30 "Mechanics of Oral Infections"
Daniel F. Lynch.....Washington, D. C.

2:50 "Gastroscopic Observations and Clinical Pathology"
Roy Lyman Sexton (M.D.).....
.....Washington, D. C.

3:15 "The Anachoric Effect as a Factor in Pulpitis"
Hamilton B. G. Robinson..St. Louis, Mo.
Leroy R. Boling (Ph.D.)..St. Louis, Mo.

3:35 "A Study of the Oral Tissues in Leukemia"
Thomas J. Cook.....Philadelphia, Pa.

4:00 "Pathologic Changes of Local and Systemic Nature in Human Jaws Obtained at Necropsy"
Henry Goldman .....Boston, Mass.

4:20 "The Use of Sodium Carbonate in the Treatment of Vincent's Infection"
S. Leonard Rosenthal..Philadelphia, Pa.

WEDNESDAY MORNING, SEPTEMBER 11

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Public Auditorium—South Hall A)

9:30 a.m. to 12:00 m.

9:30 "Cause and Prevention of Amalgam Failures"
George S. Easton.....Iowa City, Iowa

10:15 "The Silicates, with a Reference to Zinc Phosphate Cements"
J. W. Rousch.....Oakland, Calif.

11:00 "Nutritional Deficiency Disease"
Russell L. Haden (M.D.).Cleveland, Ohio

FULL DENTURE PROSTHESIS

(Public Auditorium—Ballroom)

9:30 a.m. to 12:00 m.

9:30 "Esthetics in Full Denture Restorations"
Walter J. Pryor.....Cleveland, Ohio

10:15 "A Survey Report on Currently Used Denture Base Materials"
George C. Paffenbarger.....
.....Washington, D. C.

11:00 "Anatomic Landmarks of Value in Complete Denture Construction"
Harold L. Harris.....St. Paul, Minn.

PARTIAL DENTURE PROSTHESIS

(Public Auditorium—Little Theatre)

9:30 a.m. to 12:00 m.

9:30 "Logical Limitations in the Application of the Fixed Bridge"
F. B. Vedder.....Ann Arbor, Mich.

10:15 "Fixed Bridgework Which Meets Functional, Physiologic and Esthetic Requirements"
George M. Hollenback.....Los Angeles, Calif.

11:00 "Stresses and Strains Related to Bridge Prosthesis"
Stanley D. Tylman.....Chicago, Ill.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Public Auditorium—Music Hall)

9:30 a.m. to 12:00 m.

9:30 "George B. Winter's Concept of and Operative Technic in Impacted Mandibular Third Molars"
Ralph B. Rode.....St. Louis, Mo.

10:15 "Exodontia Errors and Their Penalties"
Frank W. Rounds.....Boston, Mass.

11:00 "The Temporomandibular Joint: Report of a Completed Research Project"
Sanford M. Moose..San Francisco, Calif.

ORTHODONTIA

(Public Auditorium—Club Room B)

9:30 a.m. to 12:00 m.

9:30 "Malocclusion Due to Premature Loss of Deciduous Teeth" (Motion picture)
B. L. Herzberg.....Chicago, Ill.

10:15 "Some of the Responsibilities of the Orthodontist to Dentist, Patient and Parent"
Bruce A. Curran.....Cleveland, Ohio

11:00 "How Important Is the Labial Frenum?"
Frederick T. Barich.....Evanston, Ill.

PERIODONTIA

(Public Auditorium—South Hall B)

9:30 a.m. to 12:00 m.

9:30 "Generation of New Bone, Peridental Membrane and Cementum in Dog and Man with Boiled Cowbone Powder"
Frank E. Beube.....New York, N. Y.

10:15 "Drugs and Prescriptions Used in Periodontia and Their Practical Application"
Edward L. Ball.....Cincinnati, Ohio

11:00 "Effect of Various Dietary Deficiencies on the Peridental Tissues"
Paul E. Boyle.....Saugus, Mass.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Public Auditorium—South Hall C)

9:30 a.m. to 12:00 m.

9:30 "X-Rays an Essential in Diagnosis and Prognosis in the Child Patient"
Russell K. Smith....Charleston, W. Va.

9:55 "Can the Small Town Practitioner Make Dentistry for Children Pay?"
Walter C. McBride.....Detroit, Mich.

10:15 "Diagnosis, Treatment and Restoration of Fractured Permanent Anterior Teeth"
Charles A. Sweet.....Oakland, Calif.

10:45 "Practice of Medicine in Dentistry"
E. C. McBeath.....New York, N. Y.

11:05 "Operative Technics to Help Control the Child Patient During Cavity Preparation"
H. H. Burkart.....Atlanta, Ga.

11:25 Discussion
Elsie Gerlach .....Chicago, Ill.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Public Auditorium—Club Room A)

9:30 a.m. to 12:00 m.

9:30 Round Table Discussion on Dental Caries

Hermann Becks...San Francisco, Calif.
Charles F. Bodecker...New York, N. Y.
Julian D. Boyd.....Iowa City, Iowa
Virgil D. Cheyne.....Rochester, N. Y.
J. J. Enright.....Pittsburgh, Pa.
L. S. Fosdick (Ph.D.).....Chicago, Ill.
R. W. Harrison.....Chicago, Ill.
Philip Jay.....Ann Arbor, Mich.
Robert G. Kesel.....Chicago, Ill.

NOTE: The round table discussion is designed for promoting free discussion on controversial aspects of dental caries among students of the problem engaged in active research and study. The subject will be open to general discussion before the end of the session.

WEDNESDAY AFTERNOON SEPTEMBER 11

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Public Auditorium—South Hall A)

2:30 to 5:00 p.m.

2:30 "Gold Foil in General Practice"
W. I. Ferrier.....Seattle, Wash.

3:15 "Utilization of Biologic Principles in the Practice of Operative Dentistry: Diagnosis of Carious Lesions" (Illustrated with slides)
S. S. Arnim.....Richmond, Va.

4:00 "Endocrinology in Relation to Dentistry"
E. P. McCullagh (M.D.).Cleveland, Ohio

FULL DENTURE PROSTHESIS

(Public Auditorium—Ballroom)

2:30 to 5:00 p.m.

2:30 "Prosthetic Dental Service for the Army in Peace and War"
Leigh C. Fairbank....Washington, D. C.

3:15 "Establishing the Vertical Dimension in Complete Denture Service"
Robert R. Gillis.....Hammond, Ind.

4:00 "Changes in the Mandible Resulting from Closure of the Bite, with Particular Reference to Edentulous Patients"
William M. Rogers....New York, N. Y.

PARTIAL DENTURE PROSTHESIS

(Public Auditorium—Little Theatre)

2:30 to 5:00 p.m.

2:30 "Development of Partial Denture Design"
Raymond L. Girardot....Detroit, Mich.

3:15 (To be announced later.)

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Public Auditorium—Music Hall)

2:30 to 5:00 p.m.

2:30 "Surgical Correction of Facial Injuries and Traumatic Deformities"
William A. Lange (M.D.).Detroit, Mich.

3:15 "Complications of Mandibular Third Molar Conditions: Causative Factors and Methods of Control"
J. P. Henahan.....Hollywood, Calif.

4:00 "Osteomyelitic Conditions as Found in the Mandible"
V. B. Dalton.....Cincinnati, Ohio

ORTHODONTIA

(Public Auditorium—Club Room A)

2:30 to 5:00 p.m.

Session to be combined with the Research Section (Consult program)

PERIODONTIA

(Public Auditorium—South Hall B)

2:30 to 5:00 p.m.

2:30 "The Occlusal Factor in Periodontal Disease"
Harold J. Leonard....New York, N. Y.

3:15 "Does Toothbrushing Accomplish More Than Periodontal Treatment?"
J. Albert Jacobsmeyer...St. Louis, Mo.

4:00 "Vincent's Infection"
F. D. Francis.....Iowa City, Iowa

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Public Auditorium—South Hall C)

2:30 to 5:00 p.m.

2:30 "Pits and Fissures in Permanent Teeth: Their Treatment"
Thomas A. Gardner.....Omaha, Nebr.

3:00 Discussion
Drexell A. Boyd.....Indianapolis, Ind.

3:10 "Partial Pulpectomies in the Young Permanent Teeth"
Kenneth A. Easlick...Ann Arbor, Mich.

3:40 Discussion
B. Elizabeth Beatty....Philadelphia, Pa.

3:50 "The General Practitioner's Responsibility in the Prevention of Malocclusion"
Frank F. Lamons.....Atlanta, Ga.

4:10 Discussion
George W. Teuscher.....Chicago, Ill.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Public Auditorium—Club Room A)

2:30 to 5:00 p.m.

Symposium on Growth and Development

2:30 "Some Observations on the Physical Growth and Development of Adolescent Children"
William Walter Greulich.Cleveland, Ohio

3:15 "Health and Development as Reflected in Body Growth"
Carl C. Frances (M.D.).Cleveland, Ohio

4:00 "Health and Development as Registered in the Face"
John W. Richardson....Cleveland, Ohio

THURSDAY MORNING SEPTEMBER 12

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Public Auditorium—South Hall A)

9:30 a.m. to 12:00 m.

9:30 "Conservation of Time in Operative Procedure" (Illustrated by colored motion pictures)

"The Value of Postgraduate and Study Group Work"
J. C. Metcalf.....Alhambra, Calif.

10:15 "Foods, Vitamins and Antiseptics as an Aid in Controlling Dental Caries"
Milton Theodore Hanke (Ph.D.)....
.....Chicago, Ill.

11:00 "Factors in the Action of Drugs of Interest to the Dentist"
Frederick C. Mayer (Ph.C., B.S.)....
.....Milwaukee, Wis.

Business session and election of officers.

FULL DENTURE PROSTHESIS

(Public Auditorium—Ballroom)

9:30 a.m. to 12:00 m.

9:30 "Full Denture Service"
C. O. Flagstad.....Minneapolis, Minn.

10:15 "Prosthetic Dentistry in the United States Navy"
A. H. Grunewald....New York, N. Y.

11:00 "Psychology as a Factor in the Handling of Denture Patients"
Cecil H. Bliss.....Sioux City, Iowa
Business session and election of officers.

PARTIAL DENTURE PROSTHESIS

(Public Auditorium—Little Theatre)

9:30 a.m. to 12:00 m.

9:30 "Effect of Heat Treatment on Partial Denture Structures"
Floyd A. Peyton (Sc.D.).....
.....Ann Arbor, Mich.

10:15 "Preliminary Report on Base Metal Alloys Used in Prosthesis"
John R. Beall (B.S.)..Washington, D. C.
Business session and election of officers.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Public Auditorium—Music Hall)

9:30 a.m. to 12:00 m.

9:30 "General Anesthesia in Its Relation to Exodontia and Oral Surgery"
E. A. Peebles.....Wilmington, Ohio

10:15 "Preoperative and Postoperative Treatments in Exodontia"
Vernor H. Eman..Grand Rapids, Mich.

11:00 "Procedures in Exodontia for the General Practitioner" (Colored movie film showing forceps and exolever technic)
D. P. Snyder.....Columbus, Ohio
Business session and election of officers.

ORTHODONTIA

(Public Auditorium—Club Room B)

9:30 a.m. to 12:00 m.

9:30 "Case Analysis with the Aid of Cephalometric Roentgenograms"
B. Holly Broadbent....Cleveland, Ohio

10:15: "Effect on Occlusion of Uncontrolled Extraction of First Permanent Molars: Prevention and Treatment"
J. A. Salzmann.....New York, N. Y.

11:00 "Heredity Versus Acquired Forces in Developmental Growth of the Skull; How to Prevent Orthodontic Conditions"
Vernon L. Hunt.....Arcata, Calif.
Business session and election of officers.

PERIODONTIA

(Public Auditorium—South Hall B)

9:30 a.m. to 12:00 m.

9:30 "Mouth Lesions of Local and Systemic Origin"
L. R. Cahn.....New York, N. Y.

10:15 "Conservatism in Periodontal Treatment"
W. Y. Hayden.....London, Ontario

11:00 "Skeletal Degeneration of Primitive Races with Modernization"
Weston A. Price.....Cleveland, Ohio
Business session and election of officers.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Public Auditorium—South Hall C)

9:30 a.m. to 12:00 m.

9:30 "Dentistry's Obligation to Society: What Can We Do?"
Loren T. Hunt.....Lincoln, Nebr.

10:00 "Development of Public Dental Health Service in the United States"
Frank C. Cady.....Washington, D. C.

10:20 "Objectives, Trends and Accomplishments in the American Association of Public Health Dentists"
Vern D. Irwin.....Minneapolis, Minn.

10:40 "What Do We Have That Is Authentic in Dental Health—That We Can Teach to School Children?"
Jacob M. Wisan.....Elizabeth, N. J.

11:00 "What Mechanism Can We Use to Develop a Preschool Dental Health Program?"
Richard C. Leonard.....Baltimore, Md.

11:20 "Duties, Responsibilities and Potentialities of a Dental Director in the State Department of Health"
Charles F. Deatherage..Springfield, Ill.
Business session and election of officers.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Public Auditorium—Club Room A)

9:30 a.m. to 12:00 m.

9:30 "Benign Giant Cell Tumors"
Gregory N. Brown (M.D.).....
.....New York, N. Y.
Charles G. Darlington (M.D.).....
.....New York, N. Y.

10:15 "Repair of Facial Defects with Prosthesis Using a Latex Compound"
A. H. Bulbulian.....Rochester, Minn.

10:35 "Galvanic Corrosion and Marginal Defects of Dental Amalgrams"
Irl C. Schoonover (Ph.D.).....
.....Washington, D. C.

11:00 "Influence of the Endocrines and Diet on Teeth"
Isaac Schour .....Chicago, Ill.
Business session and election of officers.

GENERAL CLINIC PROGRAM

THURSDAY AFTERNOON AND FRIDAY, SEPTEMBER 12-13

SECTION CLINICS

Operative Dentistry, Materia Medica and Therapeutics

"Stabilizing Loose Teeth and Closing Destructive and Annoying Contact Points by the Use of Interlocking Inlays"
E. E. Bailey.....Denver, Colo.

"Making Porcelain Inlays by Direct Method"
Nye White Goodman.Los Angeles, Calif.

"Silicate Cements"
J. W. Rousch.....Oakland, Calif.

"Gold Foil"
Douglass W. Dyer...Los Angeles, Calif.

Oral Surgery, Exodontia and Anesthesia

"Reduction of Fractures of the Mandible"
S. F. Sweet.....Minot, N. D.

"Surgical Exodontia Without the Aid of Mallet and Chisels"
Samuel Cartin .....Toledo, Ohio

Orthodontia

"Preventive Orthodontics, Including Space Maintainers"
F. A. Grimmett.....Youngstown, Ohio

"Soldering Flangeless Tubes"
Samuel D. Harris.....Detroit, Mich.

"Orthodontia for Adults"
Harley E. Stone.....Columbus, Ohio
Floyd W. Stone.....Cincinnati, Ohio

"Thumb-Sucking Appliances"
Frederich T. Barich.....Evanston, Ill.

"The Coil Spring, Its Uses and Results"
Lewis Goldberg .....Englewood, N. J.

"Use of the Guide Plane in Distoclusion"
Frederick R. Aldrich....Columbus, Ohio

"Combining Welding and Soldering in Construction of Chrome Alloy Orthodontic Appliances"
A. F. Jacobi.....Clinton, Iowa

"Adjustable Stop for Labial Wire Without Soldering"
D. C. Miller.....Columbus, Ohio

Children's Dentistry and Oral Hygiene

"Stainless Steel Space Retainers"
Joseph S. Restarski.....Chicago, Ill.

"Cast Restorations for Deciduous Teeth and Cast Space Retainers"
R. M. Erwin, Jr.....Portland, Ore.

"Operative Procedures in the Child's Mouth"
Roscoe S. Baker.....Sidney, Nebr.

"Space Retention for the Child"
John E. Gaffney.....Dodgeville, Wis.

"Clinical Procedures for the Child Patient"
R. E. Wild.....St. Paul, Minn.

"Diagnosis—Dentistry for Children"
Russell K. Smith....Charleston, W. Va.

"Your Child Patient"
L. F. Perry.....Wayne, Nebr.

"Pulp Therapy in the Child Patient"
M. S. Fields.....Panama City, Fla.

Research Section

"Dental Amalgams: (1) Galvanic Corrosion; (2) Marginal Defects and (3) Exhibits"
Irl C. Schoonover (Ph.D.).....
.....Washington, D. C.

INDIVIDUAL AND GROUP CLINICS

Arkansas

"Treatment of Fractures"
H. C. Berry.....Little Rock, Ark.

Southern California

"Actual Case Showing Use of Dental Technic in Radium Treatment of Cancer of Mucosa"
E. Boyd Thompson..Los Angeles, Calif.

"Reconstruction Oral and Plastic Surgery"
Arthur E. Smith....Los Angeles, Calif.

"Analysis and Control of Postextraction Complications in Mandibular Third Molar Area"
J. P. Henahan.....Los Angeles, Calif.

"Treatment of Fractures of the Maxilla"
Chester H. Webber....San Diego, Calif.

Connecticut

"Exodontia"
Augustine L. Cavallaro.....
.....New Haven, Conn.

"A New Concept Regarding Apicoectomy"
Phillip M. Chernoff..Middletown, Conn.

Florida

"Correct Bite Registration with Equalized Pressure in Full Denture Construction"
W. G. Sanchez.....Miami Beach, Fla.

"An Improvement in Dental Pulp Testers"
R. H. Brockman....St. Petersburg, Fla.

"Full Dentures"
Earl L. Richey.....Chicago, Ill.

"Results of Ten Years' Research in the Casting of Plastic Inlays"
William E. Wilson.....Springfield, Ill.

Group Clinic

"Root Canal Problem"
E. D. Coolidge, Chairman.....
.....Chicago, Ill.
George E. Meinig.....Evanston, Ill.
E. A. Archer.....Chicago, Ill.
William Nixon Holmes....Chicago, Ill.
Henry Kahn .....Chicago, Ill.
Ralph G. Larsen.....Chicago, Ill.
D. A. Meinig.....Evanston, Ill.
Herbert E. Weis.....Chicago, Ill.

"Treatment of Fractured Anterior Teeth in Children"
H. A. Zander.....Chicago, Ill.

"Use of Molar Root Dividers in Adults and Children"
G. A. Hoskins.....Chicago, Ill.

"Photography in Patient Education"
Waldemar A. Link.....Chicago, Ill.

"Facial Diagnosis in Orthodontia"
Jerome J. Vlk.....Chicago, Ill.

"Advantages of the Sectional Template over the Full Template in Immediate Denture Insertion"
A. N. Cigrand.....Chicago, Ill.

"Fournet-Tuller Impression Technic for Full Lower Dentures"
Jerome L. Wilher.....Chicago, Ill.

"Surgical Removal of the Periodontal Pocket"
Simon B. Matzkin.....Chicago, Ill.

"Full Denture Construction"
Harry E. Denen.....Chicago, Ill.

"Full Denture Construction"
LeRoy E. Kurth.....Chicago, Ill.

"Porcelain Jacket Crown. Indication and Preparation for Normal, Malposed and Hypoplastic Teeth and Abutments on All Porcelain and Thimble Bridges"
Sophia N. Bolotny.....Chicago, Ill.

"The Fixed-Bar Removable Bridge"
C. W. Jackman.....Chicago, Ill.

"The Pack Method and Electric Coagulation in the Treatment of Periodontoclasia" (Shown by slides)
S. H. Goodfriend.....Chicago, Ill.

"A Simplified Accurate Technic of Making Occlusal and Proximoclusal Gold Inlays"
Joseph Krohn .....Chicago, Ill.

"Arch Alinement with Porcelain"
Henry L. Boris.....Chicago, Ill.

"Intravenous Anesthesia in Dental Surgery"
Paul L. Lane.....Chicago, Ill.

Iowa

"A Few Simple Hints on Obtaining Wax Patterns for Gold Inlays"
Don J. Fitzgerald....Mason City, Iowa

"Use of the Hollenback Pneumatic Condensor in Amalgam Restorations"
H. M. Kahley.....Story City, Iowa

"New Adjustable-Automatic Impression Trays; Balanced Occlusion on Straight Line Articulator and Stabilized Mandibular Denture"
J. M. Boland.....Sigourney, Iowa

"Case Reports of Different Types of Orthodontic Cases"
L. T. Oldham.....Mason City, Iowa

"Full Lower Impression and Upper and Lower Rebase"
Carl T. Ostrem.....Des Moines, Iowa
F. A. Barnes.....Ames, Iowa

"A Centrifuge for Artificial Stone Dies"
A. Sherman Maxon....Iowa City, Iowa

Kentucky

"Control of Child Patients"
M. L. Davis.....Louisville, Ky.

"Adult Orthodontia and Mouth Reconstruction"
O. B. Coomer.....Louisville, Ky.
R. B. Coomer.....Louisville, Ky.

"Esthetic Pontics and Fixed Bridgework"
Mark G. Randall.....Louisville, Ky.

"Electrocoagulation Technic in the Treatment of Periodontoclasia"
E. Lloyd Everly.....Bellevue, Ky.

"Full Dentures: a Technic for the General Practitioner"
Robert R. Linville....Mount Olivet, Ky.

"Prosthetics: Impression Technic, Adaptation and Retention"
E. J. Conley.....Lexington, Ky.

"Esthetics: Regrinding and Recoloring Artificial Teeth"
Metta Ogle .....Lexington, Ky.

Maryland

"Tooth Arrangement and Balance Using Individual Milled-in Bite Planes for Full Upper and Lower Dentures"
James E. Pyott.....Baltimore, Md.

"Cavity Preparation for Amalgam and Its Manipulation"
Karl F. Grempler.....Baltimore, Md.

"Direct Gold Inlay Pattern Technic"
Douglas A. Browning....Baltimore, Md.

"Indirect Impressions, Dies and Wax Patterns for Three-Quarter Crowns and Gold Inlays"
Orville C. Hurst.....Baltimore, Md.

Minnesota

"The Facebow and Its Relation to all Restorative and Reconstruction Work"
F. S. Meyer.....Minneapolis, Minn.
J. B. Towey.....Minneapolis, Minn.
W. J. Von Bank.....New Ulm, Minn.

"X-Ray Diagnosis of Focal Infection" (Culture reports on seventy-five cases with 200 lantern slides)
E. F. Lieb.....Minneapolis, Minn.

"Immediate Dentures (Non-Surgical) for the General Practitioner"
W. A. Ochs.....Mankato, Minn.

Mississippi

"Processing of Artificial Stones Preparatory to Taking Impressions and Running Models"
T. E. Brent.....Laurel, Miss.

"The Wax Pattern and Its Investment"
P. A. Thompson.....Pascagoula, Miss.

Missouri

"Color Photography in Dentistry"
M. T. Curran.....Kansas City, Mo.

"Mechanics in Root Canal Therapy"
Carl W. Sawyer.....Kansas City, Mo.

"Use of Vulcanite on Gold Castings"
F. Hubert Eversull...Kansas City, Mo.

"Construction of Orthodontic Bands"
Francis M. Calmes....Kansas City, Mo.

"Factors in Occlusal Relations"
Dayton Dunbar Campbell.....
.....Kansas City, Mo.

"Simple Methods of Reducing Fractures"
H. N. Magee.....St. Joseph, Mo.

"Removable Bridgework with Various Clasp Designs, Eliminating the Common Failures"
Charles P. Grosby.....St. Louis, Mo.

"Simplified Technic for Registering Centric and Balanced Occlusion"
B. F. Gifford.....St. Joseph, Mo.

New Jersey

"Precision Loose End Attachment"
Walter Schilke .....Englewood, N. J.

"Facial Masks as an Aid in Esthetics"
Fred F. Slaff.....Passaic, N. J.

"Indirect Impression Technic for Use with Inlay and Jacket Crown Preparations"
K. C. Pruden.....Paterson, N. J.

"Surgery as an Aid in Prosthesis"
Charles M. Peters.....Jersey City, N. J.

"Hydrocolloids in Partial Denture Construction"
James V. Giordano.....Paterson, N. J.

"Fournet-Tuller Technic"
Michael Frost .....Clifton, N. J.

"Official Dental Preparations"
Clifford L. Whitman..Hackensack, N. J.

"Practical Orthodontia"
Warren D. Haggerty..Hackensack, N. J.

"Oral Surgery"
Maxwell J. Lentz.....Passaic, N. J.

"Exodontia"
G. V. Boyko.....Paterson, N. J.

Lantern Slide Demonstration and Model Display of Fractures
John J. Lusardi.....Jersey City, N. J.

"Useful Fixed Bridge Abutments"
Earle A. Bassett.West Englewood, N. J.

Group Clinic

Table Exhibit of Children's Dentistry
Stuart D. Forrest.....Orange, N. J.
William R. Joule.....Arlington, N. J.
E. De Monseigle.....Asbury Park, N. J.
W. I. L. McGonigle....Freehold, N. J.

New York

"Impression Technic for Porcelain Jacket Crowns"
D. C. Padelford.....Rochester, N. Y.

"Children's Dentistry"
Robert M. Galbraith..Rochester, N. Y.

"Inlay Wax Manipulation"
A. B. Riffle.....Rochester, N. Y.

"New Application of Technical Factors in Radiodontia"
Ralph S. Voorhees....Rochester, N. Y.

"Exodontia Problems of the General Practitioner"
Robert A. Robinson.....Albany, N. Y.

"Clinical Children's Dentistry"
Elmer J. Pammenter..Rochester, N. Y.

"Utilizing Time While Waiting for Absorption in Constructing Partial Skeletons"
Clifford L. Gibbin....Rochester, N. Y.

"Full Upper and Lower Denture Construction"
Charles G. Lynch.....Rochester, N. Y.

"Tuller-Fournet Impression Technic for Stabilization of Upper and Lower Dentures"
E. H. Gale.....Albany, N. Y.

"Impressions for Fixed Bridgework"
H. E. Russell.....Endicott, N. Y.

"Some Simple Orthodontic Procedures"
R. D. Orcutt.....Binghamton, N. Y.

"Children's Dentistry"
F. Kenneth Baldwin....Endicott, N. Y.

"Simplified Methods of Difficult Root Removal for the General Practitioner"
Russell C. Paris.....Albany, N. Y.

"Full Upper and Lower Impression Technic"
Edgar C. Britton.....Buffalo, N. Y.

"Centric Relation"
S. Howard Payne.....Kenmore, N. Y.

"Status of Amalgam in Preventive Dentistry"
Edward J. Mehringer....Buffalo, N. Y.

"Dentistry for Children"
Eugene J. North.....Buffalo, N. Y.

"Staining of the Teeth for Full Dentures"
A. B. Henderson.....Yonkers, N. Y.

"Gold Inlays and Bridgework"
Max Pletman .....Yonkers, N. Y.

"Porcelain Work"
Louis Citron .....White Plains, N. Y.

"Fractures"
Walter W. Stevens.Poughkeepsie, N. Y.

"Construction of Complete Bridge from Single Hydrocolloidal Impression"
John T. Flynn.....Scarsdale, N. Y.

"New Plastics for Dentures"
Harry C. McBrair...Middletown, N. Y.

"Casting Platinum for Porcelain Bridges or Precision Attachments"
Ernest Granger .....Mt. Vernon, N. Y.

"Anesthesia of Tooth Structure for Cavity Preparation or Pulp Removal by Electrovection"
Charles Ogur .....Brooklyn, N. Y.

"Complication Following Extractions"
Willard S. Bell.....Long Island, N. Y.

"Gnathostatics and Diagnosis"
Leonard Kohn .....Brooklyn, N. Y.

"Practical Removable Appliances for Certain Types of Malocclusion"
Herbert H. Ernst...Long Island, N. Y.

"Children's Dentistry"
Irving M. Falkensbury.Glens Falls, N. Y.

"Wire Clasp Making Simplified"
Arthur S. Litten.....New York, N. Y.

North Carolina

"Visualizing Children's Dentistry"
L. D. Arthur.....Charlotte, N. C.

"Method of Determining Length of Needle for Injection"
E. G. Click.....Elkin, N. C.

Pennsylvania

"Acrylic Removable Bridges with Cast Clasps"
John F. Harkins.....Osceola Mills, Pa.

"Simplified Root Amputations"
Craig A. Stewart.....Rural Valley, Pa.

"Consideration of the Glenoid Fossa"
Rudolph Klicka .....Pittsburgh, Pa.

"Helpful Aids in Practice"
C. G. Sorgen.....Butler, Pa.

"Elastic Traction in Fracture Fixation; Technic in Use of Impacto-Lifts"
Allison H. Miller.....Kingston, Pa.

"Suggestions for Use at the Chair"
Robert M. Barthel.....Shamokin, Pa.

"A Satisfactory Amalgam Technic"
Frederick Vastine .....Shamokin, Pa.

"Inlays and Abutments by Direct-Indirect Method"
Louis Shrallow .....Connellsville, Pa.

"Simplified Denture Technic for Run-of-Mine Dentists"
P. Neff Myers.....Pittsburgh, Pa.

"Instrumentation for the Treatment of Periodontoclasia"
Leslie Waddill .....Pittsburgh, Pa.

Tennessee

"Dispatch in Children's Dentistry That Pays"
Lawrence T. Kennedy..Knoxville, Tenn.

"Precision Type Stress Equalizer for Removable Bridgework"
Herman C. Levitch....Memphis, Tenn.

"Baked Porcelain"
E. F. Huckaba.....Chattanooga, Tenn.

"Gold Inlays"
Hiram A. Laws....Chattanooga, Tenn.

"Mat Gold and Where Indicated"
A. E. Lawrence....Chattanooga, Tenn.

"Importance of Balanced Occlusion to Full Denture Construction"
J. Benton Neil.....Nashville, Tenn.

Texas

"Use of Pins and Pin Inlays in Restorative Dentistry"
F. W. Hinds.....Dallas, Texas

"A Method to Decrease Distortion in Dental Roentgenography"
Kenneth W. Thomas.San Antonio, Texas

"Double Plaster Impression Technic"
Ira Blake .....San Antonio, Texas

"Amalgam Technic"
William Z. Kling...San Antonio, Texas

"Aids in Exodontia and Periodontia"
J. W. Outlaw.....Beaumont, Texas

"A Short Cut to Three Quarter Crown Casting"
W. K. Waltman.....Hearne, Texas
"Simplified Inlay Impressions"
R. A. Boelsche.....Houston, Texas
"A Phase of Restorative Dentistry"
J. D. O'Farrell.....Houston, Texas
"Hydrocolloid Impressions for Inlays, Crowns and Fixed Bridges"
Walter T. Newton.....Houston, Texas
"Habits and Methods of Correction Incident to Malocclusion"
A. P. Westfall.....Houston, Texas
"A Denture Technic for Finishing Impression Taking in One Sitting"
Taylor M. Wheat...San Antonio, Texas
"A Technic for Removal of Fluorine Stain from Vital Teeth"
Guy W. Mennis.....Dallas, Texas

Virginia

"Some Practical Procedures in Exodontia and Oral Surgery" (Illustrated by carved soap models and roentgenograms)
Fred G. Repass.....Roanoke, Va.

Washington

"Scientific Procedure for Cementing and Finishing a Cast Restoration"
C. T. Fleetwood.....Seattle, Wash.

Wisconsin

"Simple Technic for Baking Porcelain Saddles and Roots on Pin Facings"
D. A. Barrett....South Milwaukee, Wis.
"Value of Metal Models in Construction of Bridgework"
A. H. Bassman.....Milwaukee, Wis.
"Importance of a Definite Technic in Prophylaxis" (Motion pictures)
E. J. Weaver.....Milwaukee, Wis.
"Simple Technic for Staining Porcelain Teeth"
H. W. Blaisdell.....Milwaukee, Wis.
"Closure of Space Between Incisors"
J. B. Franklin.....Milwaukee, Wis.
"Practical Procedure in Oral Surgery and Exodontia"
Samuel Granof .....Milwaukee, Wis.
"Tuller-Fournet Upper and Lower Impression Technic"
A. W. Henschel.....Milwaukee, Wis.
"Technic for Constructing Porcelain Inlays with and Without a Platinum Matrix"
H. M. Uebele.....Milwaukee, Wis.

American Dental Hygienists Association

Delaware

"Educational Material in an Office"
Marion Tomlinson.....Wilmington
May Meyers .....Wilmington

Illinois

"Chemical Reduction of Dental Film"
Margaret Miller .....Chicago

Georgia

"Diet"
Mayme Cornell .....Atlanta
"Sterilization"
Helen Adams .....Atlanta

Michigan

"Facial Masks"
Mable Kirschner .....Detroit
"Visual Education"
Dorothy Ward
"Progressive Prophylaxis: Instrumentation Polishing"
Virginia McGeagh
"Progressive Prophylaxis: Charting Recall"
Marjorie Wilcox
"Progressive Prophylaxis: Bite Wing X-ray Technic"
Grace Bankston

Pennsylvania

"Educational Clinic"
Mary C. Dick.....Perkasie
"The Dental Hygienist as a Technician"
Esther Ellis .....Philadelphia

Minnesota

"Prophylaxis"
Florence Strobel .....Minneapolis

Connecticut

"Dental Hygienist in Public School"
Margaret Maher .....Stamford

Massachusetts

"Laboratory Work"
Ann Levin .....Worcester

New York

"Correlation of Dental Hygienists in Public Schools"
Gertrude Houghton .....Watertown
Mary Owen .....Kenmore

Wisconsin

"Preventing the Need for Periodical Prophylaxis"
Margaret Derivan

Florida

"Educating Your Patient"
Juanita Stocks .....Miami
"Polishing Methods"
Virginia Fagan .....Miami
"Testing Your Sense of Touch"
Emilie M. Epple....Miami Beach, Fla.

SEVENTH DISTRICT CLINICS

"Perfect Inlay Dies by Copper Plating"
Ellis H. Hansen.Cleveland Heights, Ohio
"Natural Appearance with Artificial Dentures"
H. A. Sebald.....Middletown, Ohio

"Permanent Restorations for Deciduous Teeth"
Joseph D. Gage.Cleveland Heights, Ohio

"A Very Temporary Bridge"
Oscar R. Rosen.....Cleveland, Ohio

"Painless Cavity Preparation"
Stanley L. Jordan.....Dayton, Ohio

"Maxillary Sinus"
Robert F. Deebach.....Dayton, Ohio

"Orthodontics—Impacted Central Incisors and Canines"
Elmer F. Boester.....Cleveland, Ohio

"Models Showing Centers Affected in Anesthesia"
Paul E. Gabel.....Dayton, Ohio

"Intravenous Anesthetic"
E. A. Peebles.....Wilmington, Ohio

"Obtaining Centric Relation When the Vertical Dimension Is To Be Increased"
C. W. Mowry.....Fremont, Ohio

"Diagnosis and Eradication of Pyorrhea by Surgery"
John F. Novatney.....Cleveland, Ohio

"Electric Furnace and Centrifugal Casting Combined"
Harrison H. Wiltse.....Cleveland, Ohio

"Orthodontics for the Preschool Child"
Milton Rabine .....Cleveland, Ohio

Ohio State Dental School Group Clinic

Operative Department

"Class Four Inlay with Silicate Face"
C. H. Hebble.....Columbus, Ohio

"Gold Foil"
C. W. Strosnider.....Columbus, Ohio

"Indirect Inlay Technic"
Robert D. McFarland..Columbus, Ohio

"Slice Preparation"
Robert J. Mayer.....Columbus, Ohio

"Ammoniacal Silver Nitrate for Deciduous Teeth"
Carl F. Denn.....Columbus, Ohio

"Variations in the Matrix for Silicate Fillings"
Louis E. Reif.....Columbus, Ohio

Orthodontia

"Orthodontia"
E. G. Jones.....Columbus, Ohio
Robert E. Wade.....Columbus, Ohio

Root Canal Therapy

"Practical Root Canal Treatment with Bacteriologic Control"
J. H. Kaiser.....Columbus, Ohio

Prosthesis

"Lower Partial Dentures"
H. S. Shumway.....Columbus, Ohio

"Selective Grinding of Occlusal Surfaces for Dentures"
Victor L. Steffel.....Columbus, Ohio

"Tooth-Ridge Relations"
Howard W. Leeper.....Columbus, Ohio

"Preextraction Records"
R. T. Trippy.....Columbus, Ohio

"Cavity Preparation, Matrix Adaptation and Mechanical Condensation of Silver Amalgam Fillings"
E. C. Miller.....Cleveland, Ohio

"Indirect Porcelain Inlays"
E. Clay Ingram.....Cleveland, Ohio

"Some Things About Gold Foil"
George Brooks .....Wooster, Ohio

"First Aid Bandage for Fracture of the Mandible—Preoperative and Postoperative Medication"
Louis G. Hill.....Toledo, Ohio

"Gas"
C. R. Stambaugh....Youngstown, Ohio

"Thumb-Sucking Appliance"
Herbert G. Frankel....Cincinnati, Ohio

"Undesirable Conditions of Physiologic and Pathologic Source"
P. A. Gould.....Gibsonburg, Ohio

"A Simplified and Distinctive Method in Root Canal Therapy"
Rudolph Siegel .....Cincinnati, Ohio

Group Clinic

"Akron Dental Foundation"
P. A. Galloway.....Akron, Ohio
C. D. DeGruchy.....Akron, Ohio
C. P. Dietrich.....Akron, Ohio
H. W. Butler.....Akron, Ohio

"Orthodontic Correction in Springer Spaniel"
John Revesz .....Cleveland, Ohio

"Ethyl Chloride in Children's Dentistry"
George A. Calaway.....Toledo, Ohio

"A Fortune to Share—in Dentistry"
Paul E. Bennett.....Toledo, Ohio
Ethelyn Davisson .....Toledo, Ohio
Mrs. J. B. Baumgardner...Toledo, Ohio
Betty McCleary .....Toledo, Ohio

"Deflasking Acrylic Dentures"
C. F. Tuma.....Cleveland, Ohio

"A Simple Technic for Removal of Broken Root Tips"
James E. Levy.....Cleveland, Ohio

"New Method of Dry-Socket Treatment"
A. G. McGregor.....Caldwell, Ohio

"Eliminating the Error When Soldering Brackets of Bands"
Herbert L. Dershem.....Dayton, Ohio

"Permanent Marking of X-Ray Films"
W. L. Smith.....Cleveland, Ohio

"Prosthetic Facial Replacements"
I. S. Warm.....Cincinnati, Ohio

"Gingival Inlays"
N. C. Colebrook.....Cleveland, Ohio

"Simplified Equipment and Proper Technic for Taking Undistorted X-Ray Films"
Glen B. Ross.....Michigan City, Ind.

"Immediate Dentures"
V. O. Snowden.....Gary, Ind.

"Restorations and Attachments for Fixed or Badly Broken Down Vital Teeth"
L. E. Trinkle.....Terre Haute, Ind.

"Setting Jaw Fractures by the Application of Some Orthodontic Appliances"
Paul A. Risk.....Lafayette, Ind.

"Child Interest and Parent Education"
W. L. Hammersley.....Frankfort, Ind.

"Large Castings: Removable Partial Dentures and Orthodontic Regulating and Retaining Appliances"
N. G. Wills.....Connersville, Ind.

"Method of Control of Postoperative Hemorrhage"
A. L. Harter.....Kokomo, Ind.

"Gold Inlay Technic"
H. B. Burr.....Goshen, Ind.

"Vincent's Infection" (Color photomicrographs)
B. A. Martin.....Indianapolis, Ind.

"Full Dentures"
Leonidas F. Smith....Indianapolis, Ind.

"Lock-Pin Construction of Fixed Bridgework"
C. D. Morton.....Greenfield, Ind.
Miles S. Barton.....Indianapolis, Ind.

"A New Method of Constructing an Individual Water-Cooled Tray for Taking Hydrocolloid Impressions"
Donald H. Draper....Indianapolis, Ind.

Group Clinic

"The Coloring of Acrylic Resin for Denture Purposes"
S. H. Franz.....Cleveland, Ohio

"Manipulating Acrylic Resins Preparatory to Packing the Flask"
Roger W. Pryor.....Cleveland, Ohio

"The Curing of Acrylic Resins in the New Compensating Injector Flask"
Walter J. Pryor.....Cleveland, Ohio

"A Short-Cut Method in the Construction of Gold Cast Clasps"
Paul S. Hobe.....Alliance, Ohio

Group Clinic

"Exodontia, Using Nitrous Oxide Oxygen with Vaporized Vinethene in Both the McKesson and the Simplex Heidbrink Anesthesia Machines"
B. S. Rothwell, Chairman.....
.....Cleveland, Ohio
Ralph E. Creig.....Cleveland, Ohio
Leonard F. Prendergast.Cleveland, Ohio
Norman H. Denner....Cleveland, Ohio
R. J. Fleming.....Cleveland, Ohio

(Clinic at St. Vincent's Charity Hospital, Friday, September 13, at 8:30 a.m. The clinic will be relayed because of limited facilities, the time being indicated on the admission ticket. Tickets obtainable at Clinic Office, Public Auditorium.)

Group Clinic

"Nitrous Oxide-Oxygen Anesthesia and Exodontia"
Paul J. Aufderheide....Cleveland, Ohio
W. A. Nichols.....Medina, Ohio
H. J. Toomey.....Cleveland, Ohio
A. J. Aufderheide.....Cleveland, Ohio
H. H. Sell.....Cleveland, Ohio
H. J. Hoppe.....Cleveland, Ohio
T. R. Liberatore.....Cleveland, Ohio
A. J. Tomaro.....Warrensville, Ohio
S. Nichols .....Medina, Ohio
J. Daniels .....Cleveland, Ohio
P. G. Pryor.....Cleveland, Ohio

(Clinic given in the City Hospital, at 9:00 a.m., Friday, September 13. Tickets available at the Clinic Office, Public Auditorium.)

"Cause of Variables and Failures in Inlay Construction"
Carl H. Scheu.....Lakewood, Ohio

"Orthodontia"
Joseph R. Gould.....Cleveland, Ohio

"Platinum Band Porcelain Crown and Modified Crown"
B. J. Farrell.....Cincinnati, Ohio

"Dental Photographic Procedure"
A. J. Kunze.....Cleveland, Ohio

"Children's Dentistry"
E. H. Jones.....Cincinnati, Ohio

"Preextraction Records as an Aid in Full Denture Work" (Demonstrating profile recorder)
Roy E. Harris.....Cincinnati, Ohio

"Comparative Analysis of Extracted Filled Teeth After Years of Service"
W. O. Hulick.....Cincinnati, Ohio

"Anatomic Porcelain Restorations"
H. J. Geurink.....Cleveland, Ohio

"Simple Method of Procuring Accurate Registrations of Protrusive Lateral and Centric Jaw Relations"
T. S. Malson.....Cleveland, Ohio

"Reducing Fractures of the Upper Jaw"
David E. Kerr.....Conneaut, Ohio

"Complete Technic for Capping Exposed Pulps with Permanent Filling Placed Immediately"
George W. Parr.....Wadsworth, Ohio

"Infected Vital Teeth"
Raymond S. Morris.....Cincinnati, Ohio

"Anterior-Posterior Relation of Intermaxillary Influence as Seen by Study of Corrective Cases"
D. A. Paradis.....Canton, Ohio

"Anesthetic Reactions"
R. S. Buchanan.....Lima, Ohio

Group Clinic

"Oral Surgical and Pathologic Clinic"
M. B. Galvin.....Cleveland, Ohio
Edward Reiter .....Cleveland, Ohio
Paul N. Rosensweig....Cleveland, Ohio
Edward I. Robbins....Cleveland, Ohio
Samuel Michael .....Cleveland, Ohio
E. V. Shaw.....Cleveland, Ohio

(Clinic held in Mount Sinai Hospital, Thursday afternoon, September 12. Tickets obtainable at the Clinic Office, Public Auditorium.)

"Orthodontia"
William J. Barrick.....Newark, Ohio

"Fixed Bridgework Cast Direct to Pin Facings"
Lee W. Atkinson.....Salem, Ohio

"Salient Points Leading to Better Balanced Full Dentures"
Samuel S. Cohen.....Cleveland, Ohio
Robert J. Leavitt.....Columbus, Ohio

"Induction in Ethyl Chloride Anesthesia for Extraction of Deciduous and Permanent Teeth"
Louis I. Greenblum.....Akron, Ohio

"Lesions of the Oral Cavity"
Charles A. Resch.....Cleveland, Ohio

"Porcelain Jacket Crown and Porcelain Inlay Construction"
Robert J. Meyers....Indianapolis, Ind.

"Inlay Castings"
John L. Wilson.....Indianapolis, Ind.

"Use of Iridioplatinum Posts in Restorative Procedures in Operative Dentistry"
Richard C. Spayde.....Cleveland, Ohio

"Balanced Occlusion"
Theodore A. Bodine.....Akron, Ohio

"Immediate Dentures Without Surgery"
William E. Morris.....Cleveland, Ohio

THE CLEVELAND MEETING

RADIO PROGRAM

Tuesday, September 10

Station WGAR
R. Bullock Jones....Willimantic, Conn.

Station WTAM
J. M. Wisan.....Trenton, N. J.

Stations WHK, WCLE
Wallace N. Kirby...Downers Grove, Ill.

Wednesday, September 11

Station WTAM
Vern D. Irwin.....Minneapolis, Minn.

Stations WHK, WCLE
John W. Richmond..Kansas City, Kan.

Thursday, September 12

Station WGAR
Leonard Kohn.....Brooklyn, N. Y.

Station WTAM
E. H. Jones.....Cincinnati, Ohio

Stations WHK, WCLE
Ralph L. Ireland.....Lincoln, Nebr.

LUNCHEON CLUB PROGRAM

Monday, September 9, 12:00 m.

Rotary Club of Lakewood, Lakeshore Hotel, Lakewood, Ohio
Charles A. Sweet.....Oakland, Calif.

Tuesday, September 10, 12:00 m.

Kiwanis Club of Lakewood, Masonic Temple, Lakewood, Ohio
Walter T. McFall.....Asheville, N. C.

Thursday, September 12, 12:00 m.

Kiwanis Club of Cleveland, Hotel Cleveland, Cleveland, Ohio
J. Ben Robinson.....Baltimore, Md.

Lions Club of Cleveland, Hotel Carter, Cleveland, Ohio
Leroy M. S. Miner.....Boston, Mass.

Rotary Club of Cleveland, Hotel Statler, Cleveland, Ohio
Harold Hillenbrand.....Chicago, Ill.

WOMEN'S PROGRAM

Monday, September 9

9:30 p.m. Monday night, September 9, the American Dental Association will be host to the members of the Association and their families at the Music Hall, Public Auditorium, where a vaudeville show will be staged. Admission will be by ticket, to be secured on registration.

Tuesday, September 10

9:30 a.m. First General Session of the American Dental Association, Music Hall, Public Auditorium. All are invited to attend this meeting and to bring their friends.

1:30 p.m. Luncheon and style show, Grand Ballroom, Hotel Statler. All women are invited to attend. Tickets $1.25.

8:15 p.m. Second General Session of the American Dental Association, Music Hall, Public Auditorium. All are invited.

Wednesday, September 11

2:00 p.m. Three hour cruise on Lake Erie. The boat leaves the East Ninth Street Pier at 2 p.m. The Cleveland Ladies Entertainment Committee will be the hostess. Tickets should be secured on registration.

7:30 p.m. President's Ball in honor of the retiring President, Arthur H. Merritt. This will be a dinner dance and floor show in the Grand Ballroom, Hotel Statler. As reservations are limited, tickets should be secured early. Admission $2.50 per person.

Thursday, September 12

8:30 p.m. Third General Session of the American Dental Association, Music Hall, Public Auditorium. All are invited.

SCIENTIFIC, HEALTH AND HISTORICAL EXHIBITS

List of Exhibitors as of July 5, 1940

Dental Departments of State Boards of Health

Illinois State Department of Public Health, Division of Dental Health Education, Springfield, Ill.

Kentucky Department of Health, Bureau of Dental Health, Lexington, Ky.

Michigan Department of Health, Bureau of Public Health Dentistry, Lansing, Mich.

Missouri State Health Department, Dental Division, Jefferson City, Mo.

New Jersey State Department of Health, Trenton, N. J.

Ohio Department of Health, Division of Dental Hygiene, Columbus, Ohio.

Tennessee State Department of Public Health, Nashville, Tenn.

Virginia State Board of Health, Dental Division, Richmond, Va.

City Dental Programs

Chicago Health Department, Chicago, Ill.

Cleveland Board of Health, Cleveland, Ohio.

Cleveland Public and Parish Schools, Cleveland, Ohio.

Dallas Public Schools, School Health Dept., Dallas, Tex.

Memphis Health Department, Memphis, Tenn.

Newark Board of Education, Newark, N. J.

Schools

Atlanta-Southern Dental College, Atlanta, Ga.
Ralph R. Byrnes, Dean.

Baylor University, College of Dentistry, Dallas, Texas.
F. W. Hinds, Dean.

University of California, College of Dentistry, San Francisco, Calif.
Hermann Becks and W. J. Furuta, George Williams Hooper Foundation for Medical Research.
Hermann Becks and W. W. Wainwright, George Williams Hooper Foundation for Medical Research.
Hermann Becks, Herbert M. Evans and Robert D. Ray, Department of Experimental Biology.

Chicago College of Dental Surgery, Chicago, Ill. The Foundation for Dental Research of the Chicago College of Dental Surgery.

Columbia University, School of Dental and Oral Surgery, New York, N. Y.
L. M. Waugh, Division of Orthodontics.

Creighton University, School of Dentistry, Omaha, Nebr.
Edward H. Bruening.

Harvard University Dental School, Boston, Mass.
Leroy M. S. Miner, Dean.

Harvard University Medical School, Boston, Mass.
Kurt H. Thoma and Henry M. Goldman.

University of Illinois, College of Dentistry, Chicago, Ill.
M. K. Hine, Department of Dental Pathology and Therapeutics.
John M. Spence and Philip Levine, departments of Histology and Orthodontia.

Kansas City-Western Dental College, Kansas City, Mo.
R. J. Rinehart, Dean.

University of Louisville, School of Dentistry, Louisville, Ky.
J. R. Bustetter and K. R. Pfeiffer.

University of Michigan, School of Dentistry, Ann Arbor, Mich.
Ralph F. Sommer and Philip Jay.

Northwestern University Dental School, Chicago, Ill.
J. R. Schumaker.

Ohio State University, College of Dentistry, Columbus, Ohio.
Linden F. Edwards and Paul C. Kitchin, Department of Anatomy.
Louis E. Reif and E. C. Mills, Ohio State Dental Society and Ohio State University.

Pennsylvania State College, State College, Pa.
Fred D. Miller

College of Physicians and Surgeons, School of Dentistry, San Francisco, Calif.
Ernest G. Sloman, Dean.

University of Pittsburgh, School of Dentistry, Pittsburgh, Pa.
H. E. Friesell, Dean.

St. Louis University, School of Dentistry, St. Louis, Mo.
The George B. Winter Exhibit, presented by Ralph B. Rode.

Temple University, School of Dentistry, Philadelphia, Pa.
Frederic James, Department of Dental Histopathology and Periodontia.
D. B. Waugh.

Texas Dental College, Houston, Texas.
E. Kotanyi, Department of Histology and Pathology.

University of Toronto, Toronto, Canada.
Arnold D. Mason, Dean.

Washington University, School of Dentistry, St. Louis, Mo.
Earl E. Shepard.
L. R. Boling and H. B. G. Robinson, John and Mary Markle Foundation.

Western Reserve University, School of Dentistry, Cleveland, Ohio.
W. L. Wylie, Dean.

Western Reserve University, School of Medicine, Cleveland, Ohio.
Normand L. Hoerr, M.D., Department of Anatomy.
Harold N. Cole, M.D., and J. R. Driver, M.D., Department of Dermatology and Syphilology.
A. C. J. Brickel, M.D., Department of Surgery.
W. W. Greulich, The Brush Foundation.
B. Holly Broadbent, John W. Richardson and Charles B. Bolton, Bolton Fund.
John Revesz and Milton Rabine, Hamann Museum.

Organizations

American Association of Dental Editors.
American Association of Orthodontists.
American College of Surgeons.
American Dental Assistants Association.
American Dental Hygienists' Association.
American Dental Association.
American Dental Association Bureau of Public Relations.
American Dental Association Council on Dental Therapeutics and Bureau of Chemistry.
American Dental Association Committee on Dental Economics and Committee on Legislation.
American Dental Association Insurance Committee.
American Dental Association National Defense Committee.
American Dental Association Relief Commission and Dental Relief Fund Committee
American Dental Association Research Commission and the National Bureau of Standards.
American Dietetic Association.
American Medical Association.
American Oncologic Hospital, Philadelphia, Pa.
American Pharmaceutical Association.
American Red Cross.
American Society for the Control of Cancer, Inc.
Anti-Tuberculosis League, Cleveland, Ohio.
Beth Israel Hospital, Boston, Mass. M. Michael Cohen and Abraham Rudy, M.D.
Carleton College, Northfield, Minn. W. A. Grey and Mrs. W. A .Grey.
John Lewis Childs School, Floral Park, N. Y. Rita Sullivan.
City Hospital, Cleveland, Ohio. P. J. Aufderheide and staff.
Cleveland Dental Assistants Association, Cleveland, Ohio.
Cleveland Child Health Association, Cleveland, Ohio.
Cleveland Clinic, Cleveland, Ohio.
Cleveland Health Museum, Cleveland, Ohio.
Cuyahoga County Child Welfare Board, Cleveland, Ohio.
Dental Information Bureau, New York, N. Y. C. F. MacDonald.
Forsyth Training School for Dental Hygienists, Boston, Mass. Polly Ayers.
Glen Lake Sanatorium, Minneapolis, Minn. J. C. Bryant.
Guggenheim Dental Clinic, New York, N. Y. John Oppie McCall.
Maryland State Dental Association.
Mayo Clinic, Rochester, Minn. Arthur H. Bulbulian.
Municipal Tuberculosis Sanitarium, Chicago, Ill. K. J. Henrichsen, M.D.
National Congress of Parents and Teachers.
New York City Vocational Schools, New York, N. Y. J. A. Salzmann.

Rochester Dental Dispensary, Rochester, N. Y. Harvey J. Burkhart.
St. Luke's Hospital Dental Department, Cleveland, Ohio. C. P. Titus.
Tennessee State Dental Association.
U. S. Army Medical Museum.
U. S. Food and Drug Administration.
U. S. Public Health Service.
University Hospitals of Cleveland, Ohio. J. A. Sweeney.

Individual Exhibitors

Edward C. Armbrecht, Wheeling, W. Va.
Jesse V. Boswell, Springfield, Mo.
Walter E. Briggs, Attleboro, Mass.
Samuel S. Cohen, Cleveland, Ohio, and Robert I. Leavitt, Columbus, Ohio.
H. F. Curtis, Alexandria, Egypt.
G. M. Dorrance, Philadelphia, Pa.
Eduardo Ferraro, Santiago, Chile, S. A.
Harold M. Flickinger, Siloam Springs, Ark.
Otho L. Geyer, Grey Eagle, Minn.
Conrad C. Gilkison, Cleveland, Ohio.
D. M. Glover, M.D., Cleveland, Ohio.
T. A. Hardgrove, Fond du Lac, Wis.
Walter C. Hill, Merthyn A. Thomas, Harry L. Farmer and George L. Sackett, Cleveland, Ohio.
Louis H. Jorstad and Bruce C. Martin, St. Louis, Mo.
Robert A. Keilty, M.D., Washington, D. C.
Roland M. Klemme, M.D., St. Louis, Mo.
Joseph S. Landa, New York, N. Y.
Saul Levy, Scranton, Pa.
Herbert I. Margolis, Boston, Mass.
Myron Metzenbaum, M.D., Cleveland, Ohio.
Francis W. Nash, Scranton, Pa.
John H. Nesson, Boston, Mass.
Earl C. Padgett, M.D., Kansas City, Mo.
Weston A. Price, Cleveland, Ohio.
J. M. Prime and W. J. Brennan, Omaha, Nebr.
Thomas E. Prosser, Jr., East St. Louis, Ill.
Samuel Rabkin, Cincinnati, Ohio.
Bertram S. Rothwell, Cleveland, Ohio.
Carl H. Scheu, Lakewood, Ohio.
Eleanora Schuman, Milwaukee, Wis.
F. Copeland Shelden, Kansas City, Mo.
Floyd E. Straith and Claire L. Straith, Detroit, Mich.
A. Porter S. Sweet, Rochester, N. Y.
Kirman E. Taylor, Denver, Colo.
Curt von Wedel, M.D., Oklahoma City, Okla.
George R. Warner, Denver, Colo.

Hobby Exhibits

B. H. Cooper, Cleveland, Ohio.
J. V. Gentilly, Cleveland, Ohio.
W. M. Goodwin, Cleveland, Ohio.
Howard A. Hartman, Cleveland, Ohio.
C. K. Hurd, Cleveland, Ohio.
James E. Levy, Cleveland, Ohio.
Samuel M. Robbins, Cleveland, Ohio.
Paul P. Rutsky, Cleveland, Ohio.
C. J. Schultz, Cleveland, Ohio.
I. F. Steuer, Cleveland, Ohio.
William C. Stillson, Cleveland, Ohio.

Motion Picture Program

Monday, September 9

10 a.m. to 12 m.

"Removal of Mandibular Third Molar" (Demonstrating George B. Winter technic)
"Balanced Articulation"
Roland D. Fisher.....Glendale, Calif.
"Case of Periodontal Disease. Causes, Effects and Treatment"
L. J. Fitzsimmons.....Newark, N. J.

2 to 4 p.m.

"Porcelain Jacket Crown with Gold Shoulder"
Carlisle C. Bastian.....New York, N. Y.
"Modern Care of Children's Teeth"
John Oppie McCall....New York, N. Y.
"Tic Douloureux"
J. R. Jaeger.....Denver, Colo.
"Method of Equilibration of Occlusion"
Sidney Sorrin.....New York, N. Y.

Tuesday, September 10

10 a.m. to 12 m.

"Preparation and Construction of a Porcelain Veneer Crown"
J. Raymond Gill...San Francisco, Calif.
"Procedures in Operative Dentistry Gold Foil, Class III Cavity"
R. W. Rule.....Berkeley, Calif.
"Animated Studies on the Developing Dentition in the Face of the Growing Child"
B. Holly Broadbent....Cleveland, Ohio

Thursday, September 12

2 to 4 p.m.

"Growth Tendencies: Effect of Various Habits on the Dental Arches"
Vernon L. Hunt.....Arcata, Calif.
"A Cinefluorographic Study of the Human Masticatory Apparatus in Function"
Meyer Klatsky.....New York, N. Y.
"Smiling Through"
W. F. Lasby.....Minneapolis, Minn.
"Root Canal Therapy; Sterilization, Treatment and Filling"
C. P. Bannister.....Cleveland, Ohio

Friday, September 13

10 a.m. to 12 m.

"Chrome Alloy in Modern Orthodontics"
Brooks Bell.....Dallas, Texas
"Bridgework"
F. W. Hinds.....Dallas, Texas

"Movement of the Mandible Produced by Contraction of the Various Muscles of Mastication"
O. H. Stuteville.....Evanston, Ill.

"Direct Pinlay Abutment"
Walter Schilke.....Englewood, N. J.

2 to 4 p.m.

"Complete Technic of Construction of an Upper Anterior Stationary Bridge"
Robert P. Dressel.....Cleveland, Ohio

"Electrosurgery"
M. S. Strock.....Boston, Mass.
Lewis Fox.....Norwalk, Conn.

"Comparative Study of the Muscles of Mastication in Man and in the Monkey"
H. H. Shapiro.....New York, N. Y.

ANNOUNCEMENTS

AMERICAN DENTAL ASSOCIATION ECONOMICS COMMITTEE

The American Dental Association Economics Committee will meet at 10:00 a.m., Sunday, September 8, in Parlor L, Hotel Statler, Cleveland, Ohio.

AMERICAN DENTAL ASSOCIATION COMMITTEE ON LEGISLATION

The American Dental Association Committee on Legislation will meet in Parlor M of the Hotel Statler, Cleveland, Ohio, at 10:00 a.m., Sunday, September 8.

AMERICAN DENTAL ASSOCIATION MEMBERSHIP COMMITTEE

The American Dental Association Membership Committee will meet Tuesday, September 10, at 10:00 a.m., in Parlor K, Hotel Statler, Cleveland, Ohio.

PAUL W. ZILLMAN, *Chairman.*

DENTAL RELIEF FUND COMMITTEE BREAKFAST

The Dental Relief Fund Committee of the American Dental Association will hold a breakfast in Parlors 2 and 3 on the Mezzanine Floor of the Hotel Statler, Cleveland, Ohio, Tuesday, September 10, at 8:00 a.m. All members of the committee and state associates are requested to be present.

E. E. GRAHAM, *Secretary,*
Relief Commission.

AMERICAN DENTAL ASSOCIATION RESEARCH COMMISSION

The Research Commission of the American Dental Association will meet in Parlor E, Hotel Statler, Cleveland, Ohio, on the following dates:

Sunday, September 8, at 3:00 p.m.
Monday, September 9, at 10:00 a.m. and 3:00 p.m.
Tuesday, September 10, at 10:00 a.m.
Thursday, September 12, at 3:00 p.m.

DANIEL F. LYNCH, *Secretary.*

HOUSE OF DELEGATES LUNCHEON

The House of Delegates Luncheon will be held Monday, September 9, in the Hotel Statler Ballroom, at 12:30 p.m. The Ohio State Dental Society will be the host.

HARVEY J. BURKHART DAY

Tuesday, September 10, is to be known as Harvey J. Burkhart Day and a luncheon will be served in Dr. Burkhart's honor in the Euclid Ballroom, Hotel Statler. Tickets will be available during the first days of the convention; or a reservation can be made now by addressing N. H. Denner, 1241 Hotel Statler, Cleveland, Ohio.

McFALL LUNCHEON

The American Society for the Promotion of Dentistry for Children invites all convention visitors to hear Walter T. McFall speak on "Dividends for the Future" in the Cleveland Hotel Ballroom, Monday, September 9, at 12:30 p.m. Luncheon tickets $1.25.

KONRAD LUX, *President.*

ASSOCIATED GROUPS

AMERICAN ACADEMY OF PERIODONTOLOGY

The American Academy of Periodontology will hold its twenty-seventh annual meeting September 5, 6, 7, at the Hotel Cleveland, Cleveland, Ohio.

THOMAS B. HARTZELL, *President,*
710 Physicians & Surgeons Building,
Minneapolis, Minn.

AMERICAN ACADEMY OF RESTORATIVE DENTISTRY

The American Academy of Restorative Dentistry will meet in the Cleveland Hotel, Cleveland, Ohio, September 7 and 8.

AMERICAN ASSOCIATION OF DENTAL EDITORS

The American Association of Dental Editors will hold its annual meeting in the Hotel Statler, Cleveland, Ohio, September 7. Meeting: Pine Room; luncheon: Parlor C; dinner: Pine Room.

AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTS

The American Association of Public Health Dentists will hold its annual meeting in the

Hotel Cleveland, Cleveland, Ohio, September 8 and 9.

AMERICAN COLLEGE OF DENTISTS

The American College of Dentists will meet in the Grand Ballroom of the Hotel Statler, Cleveland, Ohio, September 8.

AMERICAN FULL DENTURE SOCIETY

The American Full Denture Society will hold its twelfth annual meeting in the Carter Hotel, Cleveland, Ohio, September 7 and 8.

ASSOCIATION OF AMERICAN WOMEN DENTISTS

The Association of American Women Dentists will hold its nineteenth annual meeting in the Hotel Cleveland, Cleveland, Ohio, September 9.

ASSOCIATION OF MILITARY SURGEONS
(Dental Section)

The Dental Section of the Association of Military Surgeons will hold its annual dinner in Parlor C, Hotel Statler, at 6:30 p.m., September 10.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

The National Association of Dental Examiners will meet in the Lattice Room of the Hotel Statler, Cleveland, Ohio, September 7 and 8. Luncheon in Parlors 1, 2 and 3, September 7.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS

The American Society of Oral Surgeons and Exodontists will meet in the Hotel Carter, Cleveland, Ohio, September 6 and 7.

AMERICAN SOCIETY FOR THE PROMOTION OF DENTISTRY FOR CHILDREN

The fourteenth annual meeting of the American Society for the promotion of Dentistry for Children will be held in the Hotel Cleveland, Cleveland, Ohio, Rooms 1, 3 and 5, at 10:00 a.m., September 9 (all-day session).

Program

10 a.m.

"Control of Teen Age Caries"
Charles A. Sweet.....Oakland, Calif.

"Space Retainers"
Walter C. McBride.....Detroit, Mich.

12:30 p.m.

McFall Luncheon: Ballroom
"Dividends for the Future"
Walter T. McFall.....Asheville, N. C.

2:00 p.m.

Joint meeting with the American Association of Public Health Dentists (Ballroom.)

"What Parents Should Know About Preventive Dentistry"
Richard A. Bolt (M.D.).Cleveland, Ohio

3:00 p.m.

"Light from Primitive Races on Fundamentals for Preventive Dentistry"
Weston A. Price.....Cleveland, Ohio

4:00 p.m.

"The Dentist Treats the Whole Child"
Oscar B. Markey, M.D..Cleveland, Ohio

KONRAD LUX, *President*

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH (DENTAL MATERIALS GROUP)

The Dental Materials Group of the International Association for Dental Research will hold a dinner meeting in the Lattice Room, Hotel Statler, Cleveland, Ohio, Monday evening, September 9.

INTERNATIONAL COLLEGE OF DENTISTS

The International College of Dentists will meet in the Salle Moderne, Hotel Statler, Cleveland, Ohio, Sunday, September 8.

AMERICAN DENTAL ASSISTANTS ASSOCIATION

The sixteenth annual meeting of the American Dental Assistants Association will be held at the Hotel Cleveland, Cleveland, Ohio, September 9 to 13.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION

The American Dental Hygienists' Association will hold its annual meeting at the Hotel Carter, Cleveland, Ohio, September 9 to 13.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL ALUMNI ASSOCIATION

The Northwestern University Dental School Alumni Association will hold a luncheon, Wednesday, September 11, in the Lattice Room, Hotel Statler, Cleveland, Ohio, in conjunction with the Annual Meeting of the American Dental Association.

GEORGE W. TEUSCHER, *Secretary*,
311 E. Chicago Avenue,
Chicago, Ill.

PIERRE FAUCHARD ACADEMY

The Pierre Fauchard Academy will meet in Parlor C, Hotel Statler, Cleveland, Ohio, September 9, 1940.

AMERICAN DENTAL GOLF ASSOCIATION

Among the golf clubs at which the members of the American Dental Golf Association will be privileged to play in their annual tournament in Cleveland, in September, will be three courses that have attracted national attention because they have been hosts at some of golfdom's leading events. Canterbury, at which this year's national open tournament was played and which has twice had the Western Open Tournament in recent years, is one of the highest spots near Cleveland. On a clear day, a fine view is to be had of the city and the lake beyond.

The Country Club, at which the National Amateur Tournament was played in 1935, is a beautifully laid out course, heavily trapped, but with no penalties for the straight shooter.

The Oakwood Club, scene of the $10,000 Open Tournament in 1939, and the Western Open Tournament a few years ago, is like a finely groomed park.

Any of the courses will test the golfer's skill to the utmost, yet none are of the extreme type of hilly or "freak" golf architecture.

The dinner preceding the Calcutta Sweepstakes will be held Sunday night, September 8, in the Euclid Ballroom of Hotel Statler. Attractive prizes will be furnished for the various events.

C. W. MARRIOTT, *Local Chairman,*
Rose Building,
Cleveland, Ohio.

AMERICAN DENTAL TRAP SHOOTERS LEAGUE

The Annual Shoot of the American Dental Trap Shooters League will be held at the Boston Hills Country Club, September 9, starting at 1:00 p.m. The trap program will consist of fifty 16-yard targets to be followed by fifty handicap targets, distance yardage to be based upon the scores in the first fifty. This is the customary American Dental Association shoot program, which has been in force for a number of years and in the opinion of the shooters is the fairest program possible in that it favors shooters of lesser ability.

A skeet program of 100 targets will be shot for those shooters in the profession who are not trap shooters. In conjunction with the skeet tournament, a new feature this year will be a five-man team race to be shot in conjunction with the individual place tournament. A team must be made up of members in good standing of one and the same component of the American Dental Association.

The Dental Skeet Team of South Bend, Ind., has issued a challenge, which accounts for this new feature of the program.

Team entries should be sent to Robert H. Naylon, 209 Osborn Building, Cleveland, Ohio, no later than September 1, 1940.

Suitable trophies have been obtained for winners in all events.

The Boston Hills Country Club has one of the finest layouts for both skeet and trap shooting in the State of Ohio. They have four fields available for each sport as well as a beautiful clubhouse with all the necessary appointments.

The officers of the American Dental Trap Shooters League extend an invitation to all shooters in the profession to participate in these annual events.

FORSYTH ALUMNI ASSOCIATION DINNER

The Forsyth Alumni Association will hold its annual dinner Tuesday, September 10, at 6:30 p.m., Hotel Statler, Cleveland, Ohio. Interns entering Forsyth Dental Infirmary for Children in September are cordially invited.

WILLIAM E. BENTE, *Chairman,*
North Olmsted, Ohio.

FRATERNITIES

DELTA SIGMA DELTA FRATERNITY

The fifty-sixth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Hotel Carter, Cleveland, Monday, September 9. The first session will be held at 9:30 a.m., followed by a complimentary luncheon to the members. The afternoon session will be held immediately thereafter and, on completion of the business of the Supreme Chapter, initiation of candidates will take place. The annual banquet, to which the ladies are invited, will be held at 6:30 p.m. in the Hotel Carter. On registering for the banquet, membership cards must be presented. Requests for hotel reservations may be sent to R. J. Armstrong, Chairman, Committee on Registration and Information, 2010 East 102nd Street, Cleveland, Ohio.

R. HAMILL D. SWING, *Supreme Scribe,*
BERT BOYD, *Supreme Grand Master.*

OMICRON KAPPA UPSILON

The members of Omicron Kappa Upsilon will meet for a good fellowship luncheon in Cleveland, Ohio, at the meeting of the American Dental Association, Tuesday, September 10. Announcement of the hour and place will be made later.

GEORGE W. TEUSCHER,
Supreme Secretary-Treasurer,
311 East Chicago Ave.,
Chicago, Ill.

ALPHA OMEGA FRATERNITY

The Alpha Omega Fraternity will hold a dinner September 9 at 6:30 p.m., Hotel Cleveland, Cleveland, Ohio.

PSI OMEGA FRATERNITY

The annual banquet of the National Alumni Chapter of Psi Omega will be held at the Hotel Cleveland Monday evening, September 9. All members and ladies are cordially invited. Members are to register at the Psi Omega headquarters, Hotel Cleveland, on arrival.

JAMES H. FERGUSON, *Grand Master,*
National Alumni Chapter.

XI PSI PHI FRATERNITY

Xi Psi Phi Fraternity will maintain headquarters at the Hollenden Hotel during the annual meeting of the American Dental Association in Cleveland. A reunion dinner and floor show for all Zips, ladies and friends will be held in the Hollenden Hotel, Monday evening, September 9. Forward reservations to Supreme Secretary-Treasurer, Harold W. Oppice, 1002 Wilson Avenue, Chicago, Ill., or to

FRANK W. MCDONALD,
Supreme President,
14 West 49th St., New York, N. Y.

TECHNICAL EXHIBITS

Abbott Laboratories, North Chicago, Ill.
Acralite Company, Inc., New York, N. Y.
Adams Sales Co., Stanhope, Evanston, Ill.
Aderer, Inc., Julius, New York, N. Y.
American Cabinet Co., Two Rivers, Wis.
Ames Co., W. V-B., Fremont, Ohio.
Antidolor Mfg. Co., Inc., New York, N. Y.
Austenal Laboratories, Inc., Chicago, Ill.

Baker & Co., Inc., Newark, N. J.
Bard-Parker Co., Inc., Danbury, Conn.
Bell & Howell Co., Chicago, Ill.
Boos Dental Laboratories, Henry P., Minneapolis, Minn.
Bosworth Co., Harry J., Chicago, Ill.
Buffalo Dental Mfg. Co., Buffalo, N. Y.
Burton Mfg. Co., Chicago, Ill.
Butler Co., John O., Chicago, Ill.

Cameron Surgical Specialty Co., Chicago, Ill.
Carnation Co., Milwaukee, Wis.
Castle Co., Wilmot, Rochester, N. Y.
Caulk Co., The L. D., Milford, Del.
Chicago X-Ray Film & Mount Co., Chicago, Ill.
Church & Dwight Co., Inc., New York, N. Y.
Cleveland Dental Mfg. Co., Cleveland, Ohio.
Columbia Dentoform Corp., New York, N. Y.
Columbus Dental Mfg. Co., Columbus, Ohio.
Condit, P. N., Boston, Mass.
Cook Laboratories, Inc., New York, N. Y.
Corega Chemical Co., Inc., Cleveland, Ohio.
Cosmos Dental Products, Inc., New York, N. Y.
Crescent Dental Mfg. Co., Chicago, Ill.
Curvlite Products, Inc., New York, N. Y.

Davis Co., R. B., Hoboken, N. J.
Dee & Co., Thomas J., Chicago, Ill.
Dentists' Supply Co. of New York, New York, N. Y.
Dudley Research Corp., New York, N. Y.
Durallium Products Co., Chicago, Ill.

Eastman Kodak Co., Rochester, N. Y.
Exelon Mfg., Division, Portland, Ore.

Fischer & Co., Inc., H. G., Chicago, Ill.
Friedman Specialty Co., Chicago, Ill.

General Electric X-Ray Corp., Chicago, Ill.
Goldsmith Bros. Smelting & Refining Co., Chicago, Ill.

Hanau Engineering Co., Inc., Buffalo, N. Y.
Handler & Son, Edward, Newark, N. J.
Hu-Friedy Mfg. Co., Chicago, Ill.

Ideal Tooth Incorporated, Cambridge, Mass.

Jelenko & Co., Inc., J. F., New York, N. Y.
Johnson & Johnson, New Brunswick, N. J.
Justi & Son, Inc., H. D., Philadelphia, Pa.

Kerr Dental Mfg. Co., Detroit, Mich.
Kolynos Co., The, Jersey City, N. J.
Konformax Laboratories, Brooklyn, N. Y.
Kromel Laboratories, New York, N. Y.

Lactona Incorporated, St. Paul, Minn.
Lea and Febiger, Philadelphia, Pa.
Lee Dental Appliance Co., Milwaukee, Wis.
Lippincott Co., J. B., Philadelphia, Pa.

McCaskey Register Co., The, Alliance, Ohio.
McCormick Rubber Co., Inc., E. J., Passaic, N. J.
McKesson Appliance Co., Toledo, Ohio.

Medical Protective Co., Wheaton, Ill.
Merck & Co., Inc., New York, N. Y.
Meyer Brothers, J. H., New York, N. Y.
Minimax Co., Chicago, Ill.
Mizzy, Inc., New York, N. Y.
Mosby Co., C. V., St. Louis, Mo.
Moyer Co., Inc., The J. Bird, Philadelphia, Pa.

National & American Dental Co., Cleveland, Ohio.
Ney Co., The J. M., Hartford, Conn.
Novocol Chemical Mfg. Co., Inc., Brooklyn, N. Y.

Ohio Chemical & Mfg. Co., Cleveland, Ohio.

Pelton & Crane Co., Detroit, Mich.
Pepsodent Co., Chicago, Ill.
Perkins Backing Machine Co., Tacoma, Wash.
Philip Morris & Co. Ltd., Inc., New York, N. Y.
Picker X-Ray Corporation, Waite Mfg. Division, Cleveland, Ohio.
Precious Metals Research Works, Inc., New York, N. Y.
Premier Dental Products, Philadelphia, Pa.
Proco-Sol Chemical Co., Inc., Philadelphia, Pa.
Professional Budget Plan, Inc., Madison, Wis.
Pycopé, Inc., Jersey City, N. J.

Ransom & Randolph Co., Toledo, Ohio.
Ritter Dental Mfg. Co., Inc., Rochester, N. Y.
Rocky Mountain Metal Products Co., Denver, Colo.

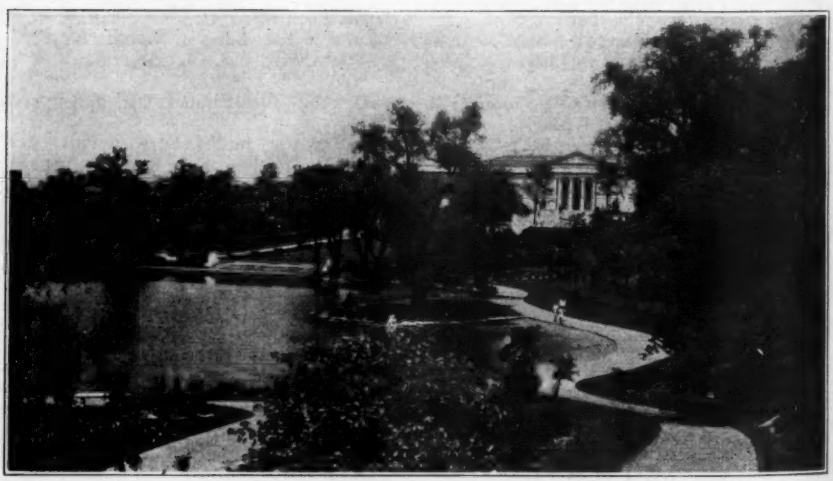
Saunders Co., W. B., Philadelphia, Pa.
Schaefer, Oskar, Jersey City, N. J.
Smith & Son Mfg. Co., Lee S., Pittsburgh, Pa.
Spyco Smelting & Refining Co., Minneapolis, Minn.
Squibb & Sons, E. R., New York, N. Y.
Star Dental Mfg. Co., Philadelphia, Pa.
Stern Co., Inc., I., New York, N. Y.

Ticonium, Albany, N. Y.

Union Broach Co., Inc., New York, N. Y.
United States Dental Mfg. Co., Cleveland, Ohio.
Universal Dental Co., Philadelphia, Pa.

Vernon-Benshoff Co., Pittsburgh, Pa.

Weber Dental Mfg. Co., Canton, Ohio.
Wernet Dental Mfg. Co., Jersey City, N. J.
Wessler Mfg. Co., Cleveland, Ohio.
White Dental Mfg. Co., S. S., Philadelphia, Pa.
White Laboratories, Inc., Newark, N. J.
Williams Gold Refining Co., Buffalo, N. Y.
Wisconsin Alumni Research Foundation, Madison, Wis.



Museum of Art, Wade Park, Cleveland, Ohio.

DENTAL HEALTH WEEK

City of Cleveland

HAROLD H. BURTON
MAYOR

June 18, 1940.

PROCLAMATION

Designating September 8th-14th, 1940, as
"Dental Health Week" in Cleveland

WHEREAS, the American Dental Association, embracing about 47,000 members from all parts of the United States, will hold its annual convention in Cleveland from September 9th to 13th, 1940, and

WHEREAS, 10,000 dentists and their families are expected to attend this convention, and

WHEREAS, the center of American dentistry for many years was in the school of Dr. John Harris in nearby Bainbridge, Ohio, and the land and original building where the school was housed has been purchased by the Ohio State Dental Society to perpetuate the memories of our pioneer dentists, and

WHEREAS, the contribution of dentistry has been an essential part of the Public Health Program that has brought about Cleveland's recognition as one of the nation's healthiest cities,

NOW, THEREFORE, as Mayor of Cleveland, I designate the week beginning September 8th as Dental Health Week in Cleveland.

Harold H. Burton
Mayor of Cleveland.

STATE OF OHIO

Executive Department

OFFICE OF THE GOVERNOR

Columbus

PROCLAMATION

Dental Health Week

WHEREAS, the preservation of the dental health of our citizens is an essential part of our public health program, and

WHEREAS, the State of Ohio played an important part in early American dentistry, the community of Bainbridge having been for many years the location of the early dental school of Dr. John Harris, and

WHEREAS, the American Dental Association will hold its annual convention in Cleveland, Ohio, from September 9th to September 13th, 1940,

NOW, THEREFORE, I, John W. Bricker, Governor of Ohio do hereby proclaim the week beginning September 8th as "Dental Health Week".

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Ohio to be affixed at Columbus, this twenty-fifth day of May, in the year of our Lord, one thousand, nine hundred and forty.

BY THE GOVERNOR:

SECRETARY OF STATE

American Dental Association Eighty-Second Annual Meeting

CLEVELAND, OHIO, SEPTEMBER 9-13, 1940

BECAUSE the Eighty-Second Annual Meeting of the American Dental Association in Cleveland, September 9 to 13, marks the centennial of American dentistry, special emphasis is being placed on the Hall of Exhibits that it may present a comprehensive and graphic account of the contributions made by the profession in ten decades.

More than 125 separate exhibits are already being prepared for display in the new $12,000,000 Cleveland Public Auditorium, which will house the convention's sessions, clinics, lectures and demonstrations, as well as the Hall of Exhibits.

Divided into three sections—science, health and history—the displays, together with the technical exhibits, will encompass the whole world of dentistry.

The American Dental Association Historical Exhibit will portray the development of national dental organizations in America. Beginning with the formation of the first American dental society, 100 years ago, the exhibit will present all of the evolutionary changes that have taken place and that have resulted in the American Dental Association as it is in 1940.

The principal events and dates in national dental organization history will be depicted by large plaques, and copies of the original constitutions and bylaws of the various national dental societies will be displayed, together with a rare collection of photographs of Past Presidents of the A.D.A., from 1859 to the present time.

Visitors to the Hall of Exhibits in Cleveland will be able to review the past as far back as Egyptian days, in displays of ancient dental instruments. The various stages of dentistry's development will be portrayed through the years down to the present time, which will be represented by up-to-the-minute exhibits of the most advanced results in research and practice.

In the light of this vivid panorama of dentistry's history, its past and its present, the thoughtful visitor may be able to envision some of the things to come in dentistry.

American Dental Association

Cleveland, Ohio — September 9-13, 1940

HOTEL RESERVATIONS

To secure hotel accommodations for the 1940 Meeting, consult the rate list below and fill out the attached blank. Mail this immediately to the hotel of your choice or to the Housing Committee, Room 1241, Hotel Statler, Cleveland, Ohio. Confirmation will be sent to you by the hotel.

Second and third choices of hotel should be indicated. If the reservation cannot be made at any of the hotels of your choice, the Housing Committee will place you in as favorable a hotel as possible and will notify you.

Please remember that a reservation constitutes a contract with the hotel to provide you with the accommodations you desire. If you find it impossible to carry out your part of the contract, namely, to occupy the room at the time agreed upon, please write or wire the hotel releasing the room, in order that it may be available for other members.

APPLICATION FOR HOTEL ACCOMMODATIONS

AMERICAN DENTAL ASSOCIATION

Cleveland, Ohio — September 9-13, 1940

HOTEL.....1st choice

HOTEL.....2nd choice

HOTEL.....3rd choice

Kindly reserve the following: ☐ Single room ☐ Double room ☐ Twin beds.

.....rooms with bath for.....persons $.....per room

.....rooms without bath for.....persons $.....per room

Arriving on September.....at.....a.m.....p.m.

ROOMS TO BE OCCUPIED BY:

NAME	ADDRESS IN FULL
.....	.....
.....	.....
.....	.....

NOTE TO HOTEL NAMED AS FIRST CHOICE: If the hotel of first choice is unable to make the reservation requested, this application should be forwarded at once to the Housing Committee, Room 1241, Hotel Statler, Cleveland, Ohio.

SCHEDULE OF RATES

ALL ROOMS WITH BATH*

Hotels	Single	Double	Twin	Suites
ALCAZAR HOTEL Surrey & Derberyshire	$3	$5		$12–16
ALLERTON 1802 East 13th Street	2.50–3	4.50	5–5.50	
AUDITORIUM HOTEL E. 6th at St. Clair	2.50–3–3.50–4	4.50–5–5.50	6–7	
BOLTON SQUARE Carnegie at E. 89th St.		5	6	
CARTER HOTEL Prospect near 9th St.	2.75–3–3.50–4	4–5–6–7	6–7–8	12–19
CLEVELAND HOTEL Public Square & Superior St.	3–3.50–4–4.50	4.50–5–6–6.50	6–7–8–9–10	22–30
FENWAY HALL Euclid at University Circle			6–7	10–12
GARFIELD HOTEL Prospect at 38th Street	2.50	3		4–6
HOLLENDEN HOTEL Superior at 6th St.	3–3.50–4–4.50–5–6	5–5.50–6–6.50–7	6–6.50–7–8–10–12	12–40
LAKE SHORE 12506 Edgewater Drive				10–12
MECCA HOTEL 1862 East 9th Street	2	3.50–4		
OLMSTED HOTEL Superior at E. 9th St.	3	6–7	7	9–10–15
REGENT HOTEL 10539 Euclid Avenue		3	5	
STATLER HOTEL (Headquarters) Euclid at 12th	3–3.50–4–4.50–6	5–5.50–6–6.50–7–8	5–5.50–6–6.50–7–7.50–8	10–15
STERLING HOTEL Prospect at E. 30th St.		5	6	
SOVEREIGN 1575 East Boulevard		5–6	8	
STOCKBRIDGE HOTEL 3328 Euclid Avenue	2	3	4	
TUDOR ARMS Carnegie & 107th St.	3–3.50	5.50	6	7–12–20–30
WADE PARK MANOR E. 107th & Park Lane	3.50–4		6	8–10–12–15
WESTLAKE Blount Street	3.50	6		12

*Rate on rooms without bath by request.

MEMBERS OF THE HOUSE OF DELEGATES 1940

DELEGATES AND ALTERNATES

ALABAMA

Delegates
Bradford, Harry, Medical Arts Building, Birmingham
Matthews, George W., Protective Life Building, Birmingham
Allen, Hunter S., Comer Building, Birmingham

Alternates
Dillon, L. B., Woodward Building, Birmingham
Blue, J. A., Comer Building, Birmingham
McGavock, R. J., Woodward Building, Birmingham

ARIZONA

Delegates
Pinkerton, W. R., Leggett Building, Douglas
Fee, Archibald G., Consolidated Bank Building, Tucson

Alternates
Bennett, Paul H., Consolidated Bank Building, Tucson
Wood, Norton J., Grunow Clinic, Phoenix

ARKANSAS

Delegates
Sternberg, I. M., Merchants Nat'l Bank Building, Fort Smith
Green, H. J., Paragould

Alternates
Mahoney, E. J., Donaghey Building, Little Rock
Jordan, J. D., Boyle Building, Little Rock

CALIFORNIA

CALIFORNIA SOUTHERN

COLORADO

Delegates
Brown, Charles J., McNeen Block, La Junta
Johnston, Lloyd W., Republic Building, Denver

Alternates
Smedley, V. C., Republic Building, Denver
Bailey, E. E., Republic Building, Denver

CONNECTICUT

Delegates
Kilduff, Gilbert, 111 W. Main St., Waterbury
Vivian, C. W., 58 Elbridge Road, New Britain
Hicks, Henry, 5 Glen Court, Greenwich
Allen, B. H., 647 Main St., Hartford
Bray, J. A., 99 Pratt St., Hartford
Peterson, C. E., 9 Elm St., Rockville

Alternates
Gibb, Hugh, Jr., 107 Whitney Ave., New Haven
Murren, John P., Jr., Medical Building, Bridgeport
Fitch, A. W., 140 State St., New London
Loftus, J. L., Colony Building, Meriden
Hertz, J. D., 46 Bedford St., Stamford
Diana, Henry F., 300 Main St., New Britain

DELAWARE

Delegate
Traynor, P. A., 807 Washington St., Wilmington

Alternate
Nelson, Clyde A., Milford

DISTRICT OF COLUMBIA

Delegates
Weakley, A. D., 1029 Vermont Ave., N.W., Washington
Fitzgibbon, D. J., 1801 Eye St., N.W., Washington
Camalier, C. Willard, 1726 Eye St., N.W., Washington

Alternates
Cole, C. D., 1835 Eye St., N.W., Washington
Colvin, E. M., Jr., 1029 Vermont Ave., N.W., Washington
Murray, J. L. B., 1029 Vermont Ave., N.W., Washington

FLORIDA

Delegates
Lunsford, E. C., 2742 Biscayne Blvd., Miami
Harlow, Lloyd N., State Board of Health, Jacksonville
Taylor, R. P., St. James Building, Jacksonville

Alternates
Renedo, J. M., Huntington Building, Miami
Sanchez, W. G., 337 Lincoln Road, Miami Beach
Wood, W. P., 442 W. Lafayette St., Tampa

GEORGIA

Delegates
Banks, W. H., Montezuma
Mason, R. Holmes, Macon
Mitchell, J. Russell, Candler Building, Atlanta

Alternates
Darby, L. H., Vidalia
Grant, T. A., 118 E. Jones St., Savannah
Weichselbaum, William, Savannah

HAWAII

IDAHO

Delegates
Brookfield, B. M., Idaho Falls
Barkdull, Stewart, Blackfoot

Alternates
Flack, P. G., Boise
Seibert, E. F., Boise

ILLINOIS

Delegates
Donelan, John J., United Mine Workers Building, Springfield
Blayney, J. Roy, 950 E. 59th St., Chicago
Jacob, L. H., Jefferson Building, Peoria
McNulty, R. W., 1757 W. Harrison St., Chicago
McNeil, W. I., 59 E. Madison St., Chicago
Kremer, L. W., 55 E. Washington St., Chicago
Boulger, E. P., 27 S. Pulaski Road, Chicago
Welch, H. W., 25 E. Washington St., Chicago
Hillenbrand, Harold, 100 W. North Ave., Chicago
Cartwright, G. E., 4000 W. North Ave., Chicago
Kalk, L. E., 5300 S. Halsted St., Chicago
Keith, J. H., 636 Church St., Evanston
Boyd, J. W., 2935 E. 79th St., Chicago
Zielinski, J. M., 2869 Archer Ave., Chicago
Arganbright, N. A., 400 State Bank Building, Freeport
Patterson, A. B., Morris Building, Joliet
Chamberlain, C. E., Jefferson Building, Peoria
Flynn, J. F., 234 E. Main St., Galesburg
McKee, W. A., Benton
Dodd, L. H., Citizens Building, Decatur
Mahoney, J. E., Wood River
Clopper, P. W., 3030 S. Adams St., Peoria
McMillan, L. G., Temple Building, Danville

Alternates
Oppice, H. W., 1002 Wilson Ave., Chicago
Logan, W. H. G., 55 E. Washington St., Chicago
Humphrey, Robert I., 185 N. Wabash Ave., Chicago
Olechowski, T., 4213 W. Division St., Chicago
Farrell, F. A., 757 W. 79th St., Chicago
Williams, W. I., 122 S. Michigan Ave., Chicago
Hughes, L. W., 160 E. 154th St., Harvey
Rusch, William E., 636 Church St., Evanston
Kesel, R. G., 808 S. Wood St., Chicago
Lusk, E. J., 4265 W. 22nd St., Chicago
Newman, C. E., 1059 N. Crawford Ave., Chicago
Starshak, T. C., 753 E. 79th St., Chicago
Hoge, D. H., Woodruff Clinic, Joliet
Tinthoff, L. F., Jefferson Building, Peoria
Snyder, C. L., Freeport
Barclay, J. A., Macomb
Tedrow, B. H., Taylorville
Burroughs, E. L., Edwardsville
Watts, H. F., Bank of Galesburg Building, Galesburg
Vedder, N. D., Carrollton
Bollinger, C. E., Alliance Life Building, Peoria

Gonwa, J. W., Chrisman
Andrews, Van, Cairo

INDIANA

Delegates
Walters, W. S., 303½ State St., West Lafayette
Douglas, R. N., 3069 S. Second St., Elkhart
Gillis, R. R., 134 Rimbach St., Hammond
Westfall, B. K., Hume-Mansur Building, Indianapolis
Ewbank, E. E., Kingman
Longcamp, H. J., Gibson Building, Aurora
Crawford, William H., 1121 W. Michigan St., Indianapolis

Alternates
Hinshaw, H. E., Medical Arts Building, Richmond
Mason, Herbert W., 638 Fairfield Ave., Indianapolis
Huckelberry, J. W., Hume-Mansur Building, Indianapolis
Bogie, William, 214 Main St., Vincennes
Miller, C. L., 1511 Miami St., South Bend
Mayfield, C. T., Armstrong-Landon Building, Kokomo
Smiley, Roy D., Peoples Bank & Trust Building, Washington

IOWA

Delegates
Foster, C. S., Dows Building, Cedar Rapids
Brann, C. T., First National Bank Building, Davenport
FitzGerald, L. M., Roshek Building, Dubuque
Charters, W. J., Southern Surety Building, Des Moines
Hemsworth, L. C., Black Building, Waterloo
Bryan, A. W., University of Iowa, Iowa City
Stewart, C. H., Farragut

Alternates
Lehman, C. V., 303 Second Ave., Cedar Rapids
Kadesky, M. R., Roshek Building, Dubuque
Altfillisch, H. J., Roshek Building, Dubuque
Whinnery, Frank B., Johnson County Bank Building, Iowa City
Belding, P. H., Waucoma
Carroll, Robert J., Pioneer Bank Building, Waterloo
Henkin, Mort, New Orpheum Building, Sioux City

KANSAS

Delegates
Buff, A. J., Mills Building, Topeka
Kramer, Leon R., State Board of Health, State House, Topeka
Robison, Homer B., Rorabaugh-Wiley Building, Hutchinson
Richmond, Fred A., Huron Building, Kansas City

Alternates
Morgan, John E., Emporia
Lucas, J. Wesley, First National Bank Building, Wichita
Richmond, John W., Huron Building, Kansas City
Bunker, H. L., Junction City

KENTUCKY

Delegates
Hume, E. C., Heyburn Building, Louisville
Keeney, B. L., Princeton
Wilson, O. D., Masonic Building, Owensboro
Walker, J. L., 640 Barbee Way South, Louisville

Alternates
O'Rourke, J. T., 129 E. Broadway, Louisville
Essig, J. I., Heyburn Building, Louisville
Donohoe, G. B., City National Bank Building, Paducah

LOUISIANA

Delegates
Dupuy, Larry J., Maison Blanche Building, New Orleans
Tiblier, Sidney L., Canal Bank Building, New Orleans
Jarrell, M. F., Commercial Bank Building, Alexandria

Alternates
Schoeny, Leo J., Maison Blanche Building, New Orleans
Robinson, S. B., Weber Building, Lake Charles
McHardy, C. A., Roumain Building, Baton Rouge

MAINE

Delegates
Browne, F. Wilbur, 128 Main St., Brunswick
Swett, Alton H., 723 Congress St., Portland

Alternates
Haskell, Alaric W., 128 Main St., Brunswick
Peaslee, Edward W., 184 Water St., Augusta

MARYLAND

Delegates
Swinehart, E. W., Medical Arts Building, Baltimore
Anderson, George M., 831 Park Ave., Baltimore
Hopkins, J. S., Bel Air
McCarthy, H. B., Medical Arts Building, Baltimore

Alternates
Robinson, J. Ben, Medical Arts Building, Baltimore
Bell, Arthur I., Medical Arts Building, Baltimore
Leonard, Richard Clay, 2411 N. Charles St., Baltimore
VanNatta, Howard, Medical Arts Building, Baltimore

MASSACHUSETTS

Delegates
Brown, George Cowles, 332 Main St., Worcester
Peters, Maurice E., 60 Charlesgate West, Boston
Lawrence, Glenn W., 412 Beacon St., Boston
Adams, Philip E., 106 Marlborough St., Boston
Alden, Harold W., 160 Main St., Northampton
Bryans, Walter J., 76 Park St., Lee
Barnard, Frank P., 307 Main St., Worcester
Miner, Leroy M. S., 363 Marlborough St., Boston
Elliott, Mark D., 358 Commonwealth Ave., Boston
Wallace, John R., 1 Mt. Vernon St., Winchester
Cronin, Harold J., 739 Liberty St., Springfield

Alternates
Richardson, Fred W., 507 Main St., Worcester
Storz, Leon A., 9 Gaskill Road, Worcester
Tannebring, William C., 163 Cabot St., Beverly
Rounds, Frank W., 270 Commonwealth Ave., Boston
Mallett, Stephen P., 358 Commonwealth Ave., Boston
Davies, C. Lindale, 390 Main St., Worcester
Farrell, Joseph W., 246 North St., Pittsfield
Palmer, Arthur T., 51 Broad St., Lynn
Harring, Cedric F., 1330 Beacon St., Brookline
Spinney, David F., 1330 Beacon St., Brookline
Wyman, Eugene B., 51 Brattle St., Cambridge

MICHIGAN

Delegates
Henry F. J., 1170 Madison Avenue, S.E., Grand Rapids
Ward, M. L., 1308 Cambridge Road, Ann Arbor
Prince, M. W., 7634 Dexter Boulevard, Detroit
Morris, E. W., W. H. Kellogg Foundation, Battle Creek
Wright, C. J., American State Bank Bldg., Lansing
Davis, William R., Michigan Department of Health, Lansing
Jeserich, P. H., Sch. of Dentistry, Univ. of Michigan, Ann Arbor
Hooper, L. E., 114 Maple St., Wyandotte
Applegate, O. C., 916 S. State St., Ann Arbor
Matson, C. H., Dryden Building, Flint

Alternates
DeVilliers, M. S., 4400 Livernois Ave., Detroit
Jaxtimer, J. P., 14503 E. Jefferson Ave., Detroit
McGuigan, F. G., 22150 W. Michigan Ave., Dearborn
Goodsell, J. O., Second National Bank Building, Saginaw
Northrup, W. F., Stroh Building, Detroit
White, O. W., David Whitney Building, Detroit
Lowery, P. C., 8545 Gratiot Ave., Detroit
Wood, H. T., David Whitney Building, Detroit
Honey, E. A., Sr., American Nat'l Bank Building, Kalamazoo
McBride, W. C., Fisher Building, Detroit

MINNESOTA

Delegates
Ryan, Thomas P., Medical Arts Building, Minneapolis
Betker, George A. E., Winona
Cruttenden, L. M., Lowry Medical Arts Building, St. Paul
Coulter, M. R., Mankato
Flagstad, C. O., Medical Arts Building, Minneapolis
Irwin, V. D., Minnesota Department of Health, U. of M., Minneapolis
Merwin, O. J., 478 S. Snelling Ave., St. Paul
Miner, C. L., St. Cloud
Nelson, Harry W., Medical Arts Building, Minneapolis
Washburn, H. B., Lowry Medical Arts Building, St. Paul

Alternates
Gillam, C. G., Austin
Harris, H. L., Lowry Medical Arts Building, St. Paul
Johnson, R. F. D., Medical Arts Building, Minneapolis
Mee, T. J., Medical Arts Building, Minneapolis
Palmer, G. M., Bemidji
Rieke, E. A., Lowry Medical Arts Building, St. Paul
Schmid, A. R., Worthington
Swanson, Clayton A., 1009 Nicollet Ave., Minneapolis
Thom, L. W., Medical Arts Building, Minneapolis
Towey, J. B., Medical Arts Building, Minneapolis

MISSISSIPPI

Delegates
Leggett, T. Ford, Laurel
Abbott, Rush P., West Point

Alternates
Henderson, A. H., Greenville
Price, A. J., Gulfport

MISSOURI

Delegates
White, J. D., University Club Building, St. Louis
Marré, Leo F., Missouri Theatre Building, St. Louis
Rode, R. B., Frisco Building, St. Louis
Allshouse, Harry, 6333 Wyandotte, Kansas City
Rinehart, R. J., Kansas City-Western Dental College, Kansas City
Northcutt, J. Emmett, Bryant Building, Kansas City
Miller, Jesse, Maryville
Haas, William A., Tootle Building, St. Joseph

Alternates
Wright, Lloyd B., Paul Brown Building, St. Louis
Price, Gaylord H., 4068 Shenandoah Ave., St. Louis
Kornfeld, Max, Missouri Building, St. Louis
Allen, H. Wilson, Professional Building, Kansas City
Edwards, Ralph W., 17 E. 65th St., Kansas City
Eversull, E. Hubert, 315 Alameda Road, Kansas City
Mense, R. C., Hannibal
Carrel, Powell C., Webb City

MONTANA

Delegates
Dratz, F. G., Missoula
Tucker, E. W., Butte

Alternates
McCauley, D. H., Laurel
Rafish, S. M., Butte

NEBRASKA

Delegates
Hunt, L. T., Security Mutual Building, Lincoln
King, H. E., Medical Arts Building, Omaha
Whitcomb, F. F., Medical Arts Building, Omaha
Pierson, F. A., Security Building, Lincoln

Alternates
Bruening, E. H., City National Bank Building, Omaha
Snyder, H. E., Columbus
Spencer, G. L., Sharp Building, Lincoln
Leonard, F. W., Columbus

NEVADA

Delegate
Carr, George A., 669 South Virginia St., Reno

Alternate
Sullivan, Lawrence D., First National Bank Building, Carson City

NEW HAMPSHIRE

Delegates
Sawyer, Robert N., 407 Central St., Franklin
Putney, William H., 85 Pleasant St., Concord

Alternates
Fogg, Albion R., 37 South Main St., Hanover
Harris, Bill J., 37 South Main St., Hanover

NEW JERSEY

Delegates
Houghton, Frank J., 50 Glenwood Ave., Jersey City
Schilke, Walter, 46 East Palisade Ave., Englewood
Hopper, Craft A., 534 Broadway, Paterson
Jennings, Edward J., 126 West State St., Trenton
Carr, John G., 109 N. 5th St., Camden
Brach, Louis, 112 Monticello Ave., Jersey City
Reese, Sylvanus F., Weymouth & Atlantic Ave., Ventnor
Hanley, James L., 586 Central Ave., East Orange
Weber, Paul M., Citizens National Bank Building, Englewood
Crowe, Charles P., 521 Main St., East Orange
Connell, Bertrand T., 26 Journal Square, Jersey City

Alternates
Newman, Eugene W., 16 Wallace St., Red Bank
Roberts, Eugene W., 875 Haddon Ave., Collingswood
Owens, John S., 109 North 5th St., Camden
De Monseigle, Edward, Electric Building, Asbury Park
Scott, John W., 196 N. 18th St., East Orange
Burke, J. Frank, 921 Bergen Ave., Jersey City
Steigerwald, C. S., Jackson & Atlantic Ave., Atlantic City
Reock, Ernest G., 367 Washington Ave., Belleville
Schweikhardt, C. J., 68 Belmont Ave., Newark
Bodner, Nathaniel, 691 Bergen Ave., Jersey City

NEW MEXICO

NEW YORK

Delegates
Adams, Fred R., 55 W. 42nd St., New York City
Baxter, Maxwell D., Waverly
Burgun, Joseph A., 142 Joralemon St., Brooklyn
Burkhart, Harvey J., P. O. Box 879, Rochester
Burns, Gerald G., 35 Chestnut St., Rochester
Burr, LeRoy E., 27 Ludlow St., Yonkers
Callaway, George S., 654 Madison Ave., New York City
Englert, George A., 360 Main St., Catskill
Flynn, John T., Harwood Court, Scarsdale
Gibbons, Raymond M., 45 Linwood Ave., Buffalo
Glaser, Joseph M., 137 1 Jamaica Ave., Jamaica
Harrington, Edwin I., Watertown
Litten, Arthur S., 230 Central Park West, New York City
Mork, Waldo H., 501 Madison Ave., New York City
Neuber, Augustave, 619 Union St., Schenectady
Phillips, Percy T., 400 Madison Ave., New York City
Schneer, Jacob B., 10 E. 74th St., New York City
Tench, Russell W., 745 Fifth Ave., New York City
Trolley, William R., Medina
Webb, E. R., Chimes Building, Syracuse
Wells, C. Raymond, 1 DeKalb Ave., Brooklyn
Whitson, Glenn H., 80 Hanson Place, Brooklyn
Zillman, Paul W., 29 Walden Ave., Buffalo

Alternates
Bell, Willard S., 118-02 Rockaway Blvd., Ozone Park
Brown, Harold O., Cutler Building, Rochester
Burns, William McGill, 62 Hanson Place, Brooklyn
Burt, W. D., Professional Building, Jamestown
Chase, Oscar J., 140 E. 54th St., New York City
Dunning, William B., 140 E. 80th St., New York City
Falkenbury, I. M., 49 Sheridan St., Glen Falls
Fancher, Walter E., 272 S. Broadway, Yonkers
Gould, Leslie A., Woolworth Building, Watertown
Howe, Gerald D., 258 Genesee St., Utica
Howland, Wells, 122 Front St., Binghamton
Jones, Paul, 89 E. Ave., Rochester
Kauffer, H. J., 57 W. 57th St., New York City
Mimmack, Edward E., 266 Bryant Ave., Buffalo
Patterson, Guy W., Batavia
Peet, Clayton L. V., 1001 Main St., Peekskill
Schoen, David, 11a S. Grand Ave., Baldwin
Schuyler, Clyde H., 400 Madison Ave., New York City
Snell, Frank S., 81 E. Main St., Patchogue
Swenson, Merrill G., 209 E. 23rd St., New York City
Trier, Jerome H., 993 Park Ave., New York City
Varley M. F., 543 Warren St., Hudson
Wilkie, Charles A., 1 Hanson Place, Brooklyn

NORTH CAROLINA

Delegates
Minges, C. E., Rocky Mount
Lineberger, H. O., Raleigh
Jackson, Wilbert, Clinton

Alternates
Pridgen, D. L., Fayetteville
Hodgin, O. R., Thomasville
Poindexter, C. C., Greensboro
Alford, F. O., First National Bank Building, Charlotte

NORTH DAKOTA

Delegates
Blunt, J. K., Bismarck
Abbott, V. B., Minot

Alternates
Sand, R. A., Fargo
Sweet, C. F., Minot

OHIO

Delegates
Pryor, W. J., Rose Building, Cleveland
Jones, E. G., 185 E. State St., Columbus
Mills, E. C., 255 E. Broad St., Columbus
Schott, C. H., Neave Building, Cincinnati
Gentilly, J. V., Rose Building, Cleveland
Stephan, J. F., Keith Building, Cleveland
Dalton, V. B., 116 Garfield Place, Cincinnati
Wolford, W. H., Farmers Bank Building, Mansfield
Ball, E. L., Doctors Building, Cincinnati
Bach, E. N., Second Nat'l Bank Building, Toledo
Aufderheide, P. J., Rose Building, Cleveland
Way, T. I., Doctors Building, Cincinnati
Appleman, R. M., 40 S. Third St., Columbus

Alternates
Pursell, F. M., Second Nat'l Bank Building, Akron
Longfellow, J. C., Bellefontaine
Young, O. M., Marion
Cosgray, W. J., 1211 Edison Building, Toledo
Jarvis, H. C., Mercantile Library Building, Cincinnati
Lilly, T. E., Reibold Building, Dayton
Snyder, D. P., 137 E. State St., Columbus
Sedgwick, W. S., Newark
Mills, C. W., Chillicothe
Jones, W. I., 327 E. State St., Columbus
Black, F. W., Doctors Building, Cincinnati
Travis, J. W., 2679 Monroe St., Toledo

OKLAHOMA

Delegates
Lawrence, C. R., Bass Building, Enid
Dodson, George L., Muskogee
Flesher, William E., Medical Arts Building, Oklahoma City
Herring, J. Ben, Medical Arts Building, Oklahoma City

Alternates
Bonnell, A. E., Jr., Surety Building, Muskogee
Glass, J. N., National Mutual Building, Tulsa
Sinks, O. F., Dental Arts Building, Tulsa
Thompson, Ben C., McAlester

OREGON

Delegates
Harris, M. C., Tiffany Building, Eugene
Weeks, A. F., Selling Building, Portland
Bettman, M. M., Medical Arts Building, Portland

Alternates
Andrews, L. R., Astoria
Prime, F. V., 2355 State St., Salem
Watson, A. P., Medical and Dental Building, Portland

PANAMA

PENNSYLVANIA

Delegates
Brennan, Nayah C., 13 S. Main St., Shenandoah
Corcoran, John H., Scranton Life Building, Scranton
Crosby, J. M., I. O. O. F. Building, Bradford
Everhard, W. D., Calder Building, Harrisburg
Friesell, H. E., Thackery & O'Hara Sts., Pittsburgh
Grace, Linwood G., Germantown Professional Bldg., Philadelphia
Harkins, C. S., Osceola Mills
Hoeffer, Frederick H., 230 N. Fifth St., Reading
Kirkpatrick, H. M., Payne-Shoemaker Building, Harrisburg
Luckie, S. Blair, 533 E. Broad St., Chester
Mesjian, H. A., 3022 Chestnut St., Philadelphia
Nesbit, M. D., 403 Market St., Lewisburg
Nicholson, M. E., Wilkinsburg Bank Building, Wilkinsburg
O'Leary, J. T., Girard
Phillips, G. S., Masonic Building, Meadville
Robinson, W. J., 4906 Walnut St., Philadelphia
Ventura, A. L., 333 DeKalb St., Norristown
Walls, R. M., 48 E. Market St., Bethlehem
Waddill, Leslie, Jenkins Arcade, Pittsburgh
Young, A. C., 121 University Place, Pittsburgh

Alternates
Booth, A. A., Boyle Building, Sharon
Coleman, George A., 15th & Locust St., Philadelphia
Cooper, H. K., 26 N. Lime St., Lancaster
Ennis, LeRoy M., 4001 Spruce St., Philadelphia
Flanagan, J. B., 57 S. Washington St., Wilkes-Barre
Fischer, H. L., Medical Arts Building, Philadelphia
Grissinger, R. D., Murphy Building, Bedford
Hassenplug, E. C., Milton
Kaplan, Edward, 35 W. Main St., Uniontown
Lawson, A. S., 524 Federal St., N. S., Pittsburgh
Lowry, Boyd A., First National Bank Building, Williamsport
Mendel, W. E., 405 E. Ohio St., Pittsburgh
Miller, A. H., 299 Wyoming Ave., Kingston
Miller, Fred D., 1122 12th Ave., Altoona
Price, J. B., 6013 Greene St., Philadelphia
Rhen, L. J., 396 S. Second St., Steelton
Reichard, H. C., Riant Theatre Building, Conshohocken
Robinson, F. C., Fayette Title & Trust Building, Uniontown
Tough, Tracy M., 145 Main St., Bradford
Willits, H. K., 750 N. Tenth St., Reading

PHILIPPINE ISLANDS

PUERTO RICO

RHODE ISLAND

Delegates
Webster, Raymond L., 155 Angell St., Providence
Morin, Edward C., 188 Main St., Pawtucket

Alternates
Midgley, Albert L., Union Trust Building, Providence
Devine, Edwin K., Union Trust Building, Providence

SOUTH CAROLINA

Delegates
Bumgardner, E. G., Columbia
Dick, George W., Sumter

Alternates
Dunlap. T. B., Sumter
Hinson, D. C., Camden

SOUTH DAKOTA

Delegates
Elmen, Ernest W., Sioux Falls
Henderson, Willard P., Sioux Falls

Alternates
Jensen, Harold E., Madison
Matteson, F. M., Highmore

TENNESSEE

Delegates
Towner, Justin D., Exchange Building, Memphis
Rodgers, J. M., Chattanooga Bank Building, Chattanooga
Wood, Claude R., Medical Arts Building, Knoxville
Elam, Roy O., Medical Arts Building, Nashville

Alternates
Bigger, J. F., Medical Arts Building, Memphis
Braly, T. E., Volunteer State Life Building, Chattanooga
Sharp, J. Guilford, Medical Arts Building, Knoxville
Seeman, George F., Doctors Building, Nashville

TEXAS

Delegates
Talbot, W. O., Trinity Life Building, Fort Worth
Robertson, G. P., Nix Professional Building, San Antonio
Hinds, Frederick W., 1420 Hall St., Dallas
Scherer, Walter H., Medical Arts Building, Houston
Thielen, B. F., First National Bank Building, Paris
Garrison, Monte R., Hamilton Building, Wichita Falls
Rogers, R. L., Medical and Professional Building, Amarillo

Alternates
Turner, Lewis C., Medical Arts Building, San Antonio
Edwards, J. T., Medical Arts Building, Fort Worth
Ogle, L. Willard, Medical Arts Building, Dallas
Outlaw, J. W., San Jacinto Building, Beaumont
Waltman, W. K., Hearne
Lux, Konrad, Medical Arts Building, Waco
Elliott, F. C., 1018 Blodgett Ave., Houston

UTAH

VERMONT

VIRGINIA

Delegates
Jenkins, M. S., Medical Arts Building, Roanoke
John, J. E., Medical Arts Building, Roanoke
Bear, Harry, Professional Building, Richmond
Hodgkin, W. N., Warrenton

Alternates
Via, Dan O., 903 E. Main St., Charlottesville
Simmons, R. F., Medical Arts Building, Norfolk
Ballou, N. Talley, State Board of Health, Richmond
Wash, A. M., Medical Arts Building, Richmond

WASHINGTON

Delegates
Martin, A. L., Medical and Dental Building, Seattle
Stansbery, C. J., Medical and Dental Building, Seattle
Fleetwood, C. T., Medical and Dental Building, Seattle
Ellsperman, G. A., Herald Building, Bellingham

Alternates
Hagen, W. H., Medical and Dental Building, Seattle
Ferrier, W. I., Medical and Dental Building, Seattle
Zech, L. W., Medical and Dental Building, Seattle
Argue, J. E., Fourth & Pike Building, Seattle

WEST VIRGINIA

Delegates
Summers, Howard E., First National Bank Building, Huntington
Boydson, W. J., Fairmont
Cleek, L. D., Bartley

Alternates
Poindexter, J. B., Professional Building, Huntington
Lett, W. B., Caretta
Price, C. L., Shinnston

WISCONSIN

Delegates
Hardgrove, T. A., Fond du Lac
Wilson, George W., 5708 Washington Blvd., Milwaukee
Baumann, C. J., 408 W. Greenfield Ave., Milwaukee
Bull, F. A., 3887 N. 18th St., Milwaukee
Martin, F. J., Medford
Redeman, E. H., 1723½ Main St., Marinette
Moen, O. H., Watertown
Hansen, M. C., 919 Arcade Building, Racine
Donovan, J. M., Neenah
Justin, J. P., 1723 W. Center St., Milwaukee

Alternates
Calkins, E. D., 301 Arcade Building, Racine
Grewe, H. G., Eau Claire
Finke, A. H., 925 N. Eighth St., Sheboygan
Loomans, J. A., Waupun
Zimmer, A. J., Vogelson Building, Manitowoc
LeSage, G. A., 1320 Tower Ave., Superior
Bennett, Glen, Wisconsin Rapids
Collins, C. P., 625 57th St., Kenosha
McWilliams, B. M., First Central Building, Madison
Hilgert, R. M., 829 University Ave., Madison

WYOMING

Delegate
Pepper, James, Rawlins

Alternate
Kane, P. J., Sheridan

U. S. PUBLIC HEALTH SERVICE

Delegate
Hooper, N. Y., U. S. Public Health Service, Washington, D. C.

Alternate
Robinson, R. L., U. S. Marine Hospital, Baltimore, Md.

U. S. VETERANS ADMINISTRATION

Delegate
Fowler, Milburn M., U. S. Veterans Administration, Arlington Building, Washington, D. C.

Alternate
Koch, Harvey H., Administration Facilities, Hines, Ill.

ARMY

Delegate
Moore, Don G., Army War College, Washington, D. C.

Alternate
Snyder, Oscar P., West Point, N. Y.

NAVY

Delegate
Tartre, Joseph A., U. S. Naval Training Station, Great Lakes, Ill.

Alternate
Maxwell, M. M., U. S. Naval Dental School, Washington, D. C.

DEATHS

ANDREWS, WILLIAM H., Wilmette, Ill.; University of Illinois College of Dentistry, 1910; died May 12.

BARRETT, A. F., Keene, N. H.; Tufts College Dental School, 1897; president of the New Hampshire Dental Society, 1912; died June 25; aged 73.

BERRY, FREDERICK H., Milwaukee, Wis.; University of Michigan School of Dentistry, 1883; died May 3; aged 77.

BOLZELL, CHARLES E., Wymore, Nebr.; Creighton University College of Dentistry, 1910; died April 8; aged 57.

BROCK, A. J., Grinnell, Iowa; University of Louisville School of Dentistry, 1904; died April 15; aged 58.

BRYAN, FRANK, Dublin, Texas; Ohio College of Dental Surgery, 1906; died April 17; aged 58.

BUCHANAN, HUGH ANTHONY, Fort Worth, Texas; died May 19; aged 71.

BUTLER, C. VOYLE, Pittsburgh, Pa.; University of Pittsburgh School of Dentistry, 1907; died April 15; aged 52.

CANFIELD, MILTON R., Chicago, Ill.; Chicago College of Dental Surgery; died recently; aged 42.

CASWELL, DANIEL B., St. Petersburg, Fla.; Southern Dental College, 1894; died June 16; aged 72.

CRESS, GEORGE TILDEN, California, formerly of Sioux City, Iowa; Chicago College of

Dental Surgery, 1898; died April 17; aged 64.

COLVIN, LEWIS VESTON, Jasper, Ala.; Southern Dental College, 1916; died May 2; aged 56.

DAVIN, THOMAS EDWARD, Kenosha, Wis.; Marquette University Dental School, 1914; died April 4; aged 50.

DEAN, EDWIN ARTHUR, Sheboygan, Wis.; Marquette University Dental School, 1900; died April 10; aged 70.

EICKELBERG, GEORGE C., Fairbank, Iowa; State University of Iowa, College of Dentistry, 1898; died May 4; aged 73.

GORE, FRANK A., Sidney, Iowa; Chicago College of Dental Surgery, 1902; died May 1; aged 63.

GRANT, ALBERT S., Austin, Texas; died June 17; aged 73.

GRIFFIN, TRUMAN A., Cedar Rapids, Iowa; School of Dentistry, University of Pennsylvania, 1900; died May 9; aged 65.

HERRON, JOHN G., Creston, Iowa; died March 26; aged 74.

KOHN, OTTO W., Peoria, Ill.; University of Illinois College of Dentistry, 1898; died March 19; aged 63.

MAHOOD, D. G., Cedar Rapids, Iowa; Chicago College of Dental Surgery, 1900; died May 16; aged 66.

MARCINKIEWICZ, CHARLES J., Detroit, Mich.; University of Michigan School of Dentistry, 1918; died April 23; aged 45.

MITCHELL, WILLARD T., Monrovia, Calif., formerly of Davenport, Iowa; State University of Iowa, College of Dentistry; died May 20; aged 73.

NANCE, C. L., Tampa, Fla.; University of Louisville School of Dentistry, 1901; died recently.

O'NEILL, EMMET, JR., Philadelphia, Pa.; University of Pennsylvania School of Dentistry, 1904; died April 15; aged 56.

RATHBUN, CHARLES N., Fremont, Nebr.; Kansas City Dental College, 1894; died February 19; aged 70.

REESE, D. J., Harrisburg, Pa.; University of Pennsylvania, School of Dentistry, 1898; died April 4; aged 62.

ROBERTS, NORMAN J., Waukegan, Ill.; Baltimore College of Dental Surgery, 1882; died June 26; aged 73.

ROCKEY, WAVERLEY J., Elmira, N. Y.; Baltimore Medical College, 1906; died March 11; aged 60.

SCHEDINE, H. E., Lima, Ohio; Ohio College of Dental Surgery, 1916; died March 3; aged 47.

SHOOP, VICTOR, Cheswick, Pa.; University of Pittsburgh School of Dentistry, 1923; died in May; aged 40.

SIEFKIN, CHARLES W., Rolfe, Iowa; University of Louisville, School of Dentistry, 1900; died March 19.

SOUDERS, GUY EMERSON, Nebraska City, Nebr.; Creighton University College of Dentistry, 1912; died March 10; aged 53.

STUTTS, EUGENE PHILLIPS, Thomasville, Ala.; Atlanta Dental College, 1903; died May 20; aged 64.

SULKERS, CHESTER F., Holland, Mich.; University of Michigan, School of Dentistry, 1923; died May 5; aged 38.

TALLANT, GEORGE C., Des Plaines, Ill.; Chicago College of Dental Surgery, 1925; died May 12; aged 38.

VON BERG, GEORGE W., Charles City, Iowa; died April 16; aged 79.

WALTON, CHARLES A., Chicago, Ill.; Northwestern University Dental School, 1899; died April 28; aged 69.

WESTWOOD, CHARLES E., Sioux City, Iowa; Baltimore College of Dental Surgery, 1905; died May 14; aged 61.

WOLD, EARL N., Fort Dodge, Iowa; Northwestern University Dental School, 1918; died May 28; aged 45.

WOOD, LEWIS E., Springfield, Ill.; Chicago College of Dental Surgery, 1897; died May 13.

WORK, CRAIG M., Ottumwa, Iowa; State University of Iowa, College of Dentistry, 1895; died March 30; aged 69.

OBITUARIES

FELIX J. DESPECHER, D.D.S.
(1867-1940)

FELIX J. DESPECHER, mayor of Ralston, Nebr., a member of the teaching staff of Creighton University Dental School and one of the oldest practicing dentists in Nebraska, died Sunday, June 9, at the age of 73.

Dr. Despecher was one of the founders of the Alliance Française here. He served as its president and recently had been regional director. Friends said the European war weighed heavily upon him. Many of his relatives were in the present French forces and many of his friends and relatives were killed in the first world war.

Born in Paris in 1867, Dr. Despecher often heard his parents tell of fleeing to the coast just before the German army surrounded the city in the Franco-Prussian war. Dr. Despecher was in Paris when the war broke out in 1914.

His father came to this country during the gold rush of 1849 and made a fortune in California. The son was educated in France and England and came to this country to study dentistry at the University of Pennsylvania. After his graduation, he came to Omaha to practice.

Dr. Despecher received his D.D.S. degree from the University of Pennsylvania. He became an instructor in materia medica at Creighton in 1912, though his service was interrupted at intervals. In 1924, he became professor of periodontoclasia. He was a fellow of the American College of Dentists.

In 1938, Dr. Despecher was awarded a 25-year plaque by Creighton University for twenty-five years of service on the faculty.

GEORGE WHEELER, B.S., D.D.S.
(1879-1940)

GEORGE WHEELER, B.S., D.D.S., F.I.C.D., past president of the Alabama Dental Association, 1939-40, died in Montgomery, June 28, just two months after completing his administration. His death followed an attack of coronary occlusion which occurred one week previously.

Born in Cherokee, Ala., November 19, 1879, the son of a Confederate Army surgeon and a kinsman of General "Fighting Joe" Wheeler, he received his early education in Huntsville, Ala., and later at Alabama Polytechnic Institute, Auburn, where he received the degree of bachelor of science in 1899. At Auburn, he was a star football player, a cadet captain and a member of the Phi Delta Theta fraternity.

In 1910, he entered the School of Dentistry, Vanderbilt University, Nashville, Tenn., from which he received the D.D.S. degree in 1913.

Immediately after graduation, he located in Montgomery, Ala., where he practiced general dentistry until the time of his death. For a period of several years, he was an associate of Dr. Olin Kirkland.

He was always active in the affairs of the Alabama Dental Association and never missed an annual meeting during his twenty-seven years in practice. He served the association as president for 1939-1940. Under his administration, the membership rose to an all-time high of 403. He raised the Relief Fund per capita contribution from 46 cents to $1.10. He served the association as delegate to the A.D.A. meetings and to the State Officers' Conference. At the last state meeting, he was elected to serve a three-year term as Delegate. In 1939, he was elected a Fellow of the International College of Dentists. He was a member of the Psi Omega dental fraternity.

In social and civic life, no one ever did more to gain prestige for the profession as a whole or served it better in the capacity of Ambassador of Good-Will. He was a charter member and first

president of the Montgomery Kiwanis Club; president of the Auburn Alumni Association; a Mason; Shriner; member of the Order of Jesters of the Shrine, and a member of the Elks. His humor, love of fun, sparkling wit and unparalleled ability as a raconteur made him much in demand as a master of ceremonies and toastmaster. He loved life and living.

He is survived by his widow, the former Annie May Magruder, of Hollandale, Miss., and two sons, George Jr. and Thomas.

George Wheeler will be sorely missed by his host of friends, the profession as a whole and particularly the Alabama Dental Association.

GEORGE WHEELER MATTHEWS.

GEORGE WHEELER, B.S., D.D.S.
(1879-1940)

CURRENT LITERATURE

Relative Value of Catgut, Silk, Linen and Cotton as Suture Material

By William H. Meade and Alton Ochsner

As far back as 1880, Kocher and Halstead demonstrated the superiority of silk over catgut as a suture material. However, it has been the opinion of most surgeons that the persistence of a suture after wound healing is detrimental, and that, in the presence of infection, it alone is responsible for continuation of the infection. Because of this, catgut, which is absorbable, has been the most popular suture material.

1. Catgut has been shown to be (a) a strong suture before being placed in the tissue, (b) absorbed at a variable rate, (c) a possible source of allergic reactions, (d) a deterrent in wound healing and (e) a possible source of wound infection.

2. Non-absorbable suture materials (a) can always be heat sterilized, (b) cause no allergic condition and (c) allow rapid wound healing.

3. After being implanted in the tissue, cotton is somewhat stronger than silk or linen.

4. Cotton shows much less tendency for tissue ingrowth and is therefore less likely to cause sinuses in the presence of infection than silk.

5. Cotton is proposed by the authors as a pliable, easily sterilized, non-irritating, inexpensive suture of sufficient strength and in proper size for most surgical procedures. —*Surgery*, 7:485, April 1940.

Arthur F. Fisher.

Present Status of Pulpless Tooth

By Louis I. Grossman

Periapical infection can, and sometimes does, cause infection elsewhere in the body. The frequency of such foci of infection and their association with systemic disease is open to question, however, and has, without doubt, been greatly overemphasized in the past. A pulpless tooth continues to have a vital relationship with the surrounding tissue and therefore cannot be considered "dead."

After reviewing the pulpless tooth as a possible focus of infection from clinical, roentgenologic, histologic and bacteriologic studies, the accumulated evidence, even at its worst, is not very striking.—*Ann. Int. Med.*, 13:1805, April 1940.

Arthur F. Fisher.

Spontaneous Amputation of the Tongue: Case Report

By Samuel Richman

A case of spontaneous amputation of the greater part of the tongue following an extensive carcinoma of the region, radiation therapy and ligation of the external carotid artery on one side is presented. The carcinoma had involved the major area of the tongue and infiltrated deeply into the muscles. What part the radiation therapy and the ligation of the artery played in the separation of the organ is not stated. The author suggests that the carcinomatous ulceration itself may have been the cause. A recurrence of the neoplasm, however, advanced rapidly and the patient died in less than eleven months after the onset of symptoms. —*Am. J. Roentgenol.*, 42:843, December 1939.

Virgil D. Cheyne.

Congenital Cranial Osteoporosis: Its Etiology and Significance. A Study of Eight Hundred New-Born Infants

By Oscar Reiss and Elena Boder

The main part of this extensive investigation consisted of studying the incidence of congenital cranial softening or osteoporosis in 800 unselected, full-term new-born infants; also, its association with various material and the infant and climatic factors. The results obtained from a statistical analysis of the data showed that there is a significant seasonal variation in the incidence of the disease, which is inverse to the curve

of sunshine. Likewise, the incidence is lowest in mothers who have reported consistent exposure to the sun during pregnancy. Congenital cranial softening seems to show a definite predilection for smaller infants. Certain evidence for the mechanical causation theory has also been found in this study.

The results of the work fail to confirm Toverud's finding that congenital cranial osteoporosis is caused by a deficiency in the calcifying factors, especially in calcium, of the maternal diet during pregnancy. The lack of a definite relation between congenital cranial softening in the offspring and the calcium and phosphorus content of the maternal diet might be considered as evidence that no such relation exists, at least under the conditions of this study. It would appear that a deficiency in vitamin D during pregnancy, rather than in the calcium and phosphorus of the maternal diet, might be the etiologic factor.—*Am. J. Dis. Child.*, 95:931, May 1940.

VIRGIL D. CHEYNE.

Ein Beitrag zur Bakterologie von Leptothrix (A Contribution to the Bacteriology of Leptothrix)

By ERHARD NIEBER

THE cultural characteristics of sixteen strains of Leptothrix and two strains of Actinomyces were tested. The organisms were isolated from tooth and throat scrapings of normal mouths, carious teeth and mouths showing paradentosis. All strains were facultative aerobes and grew best in goat's blood-agar, ascitic agar, lactose agar and both filtered and unfiltered Levinthal agar. Colony types are described and pictured. Subcutaneous injections of 0.5 cc. of saline suspensions were not pathogenic for white mice.—*Arch. f. Hyg.*, 123:316, 1940.

HAZEL TEFFT.

Acute Osteomyelitis of the Superior Maxilla in Young Infants

By N. ASHERSON

THE characteristic features of this disease are swelling of the eye, cheek, canine fossa and palate, followed by fistula and sequestrum formation. Staphylococci may be cultured from the purulent discharge. It is an infection of the maxillary bone in the region of the tooth socket of the upper deciduous unerupted molar, occurring during the first few weeks of life.

The mortality appears to be about 25 per cent. Immediate operation and drainage are indicated, and the author advocates a combination of orbital, nasal and oral incisions, in order to prevent sequestrum formation and septicemia.

The case should be treated in cooperation with a pediatrician that optimal feeding and general health may be obtained.—*J. Laryng. & Otol.*, 54:691, December 1939.

R. F. SOGNNAES.

Om Enkelte Mekaniske og Histologiske Problemer ved Rotas Rotasjon av Tenner (Some Mechanical and Histologic Problems Connected with Rotation of Teeth)

By K. REITAN

TEN upper second incisors of five healthy dogs were rotated by means of fixed appliances. The force applied varied from 9 to 250 gm., and lasted from three to fifty-nine days, after which the changes were studied histologically.

New bone as well as cellular cementum was deposited on the tension sides of the root, while no or little cementum was formed on the pressure side. Relapse after tooth rotation is due to lack of functional balance and is influenced by contraction of the subepithelial tissue. Root resorption occurred in almost every case, and was believed to be due to the oval form of the roots. It may be avoided by using a force that is intermittent or by continuous force followed by rest periods.—*Norske Tann. f. Tid.*, 49:381, 1939; 50:1, 1940.

R. F. SOGNNAES.

Primary Lymphosarcoma of the Hard Palate

By LESTER J. FRIEDMAN

PRIMARY lymphosarcoma of the hard palate is very rare. Many cases of lymphosarcoma of the hard palate have been reported, but all of these were secondary to lesions of neighboring structures. A case of primary lymphosarcoma of the hard palate is reported which responded favorably to the use of roentgen therapy.

A careful biopsy is the most important factor in diagnosis. Additional biopsies may be necessary if a representative tissue is not obtained. Treatment consists of surgical excision, electrocoagulation or roentgen and radium therapy. Radiation therapy is usually the method of choice in lymphosarcoma. Oral hygiene and extraction of diseased teeth are included in the treatment. The prognosis of these malignant neoplasms is in general good. In the case reported, the lesion was slow growing. For six months prior to treatment, it remained localized in a relatively small area of hard palate with no extension to regional lymph nodes. The patient has been examined every two months since treatment, and there has been no recurrence to date, eighteen months after admission.—*Am. J. Roent. & Rad. Therap.*, 43:702, May 1940.

ARTHUR F. FISHER.

Metastatic Adenocarcinoma in the Lower Jawbone

By RUDOLF KRONFELD and JOSEPH WEINMANN

HISTOLOGIC aspects of a metastatic tumor in the jawbone have been reported only once before. Metastases to the lower jawbone are not rare, but jawbones are almost never included in necropsy nor in microscopic study of postmortem specimens.

This case deals with a man aged 63 who had extensive metastasis of an adenocarcinoma of the prostate to the mandible. Connective tissue and bone marrow reacted to the invading tumor by extensive formation of new bone. This bone was laid down in the immediate vicinity of the neoplasm, and part of it was still uncalcified.

It is suggested that the cells of this carcinoma retained their power to promote formation of bone in susceptible connective tissue.—*Arch. Path.*, 29:683, May 1940.

ARTHUR F. FISHER.

Management of Fractures of the Maxilla

By JAMES B. DAVIDSON and ANGUS M. BROWN

THE authors have presented a complete review of maxilla fractures as discussed by various writers, plus seven of their most interesting cases. Their paper includes predisposing and exciting factors, classifications, objective and subjective symptoms, roentgenographic examination and technic, complications such as hemorrhage and shock, anesthesia, appliances, postoperative care and diet. The type of appliance to be used in every type of maxilla fracture (four types according to Ivy and Curtis) is indicated.

The cases described include men and women from 19 to 68 years of age. The splints applied were allowed to remain in position from six to nine weeks. In none of the reported cases was it necessary to reset any bones once they were alined. No secondary hemorrhage resulted in reduction of the nasal bones. There was no delay in healing and all results were completely functional, except in loss of the teeth, and no case required secondary cosmetic repair.

The paper includes eleven photographs and many skull diagrams of the cases reported.—*Mil. Surgeon*, 87:26, July 1940.

ARTHUR F. FISHER.

Follicular Odontomata

By JOSEPH L. BERNIER

THE existing theories concerning the etiology of follicular odontomes agree on many details, but they differ widely as to their pathogenesis. Since little research has been done on this subject, conclusions are difficult, but there are a few facts which the author points out. The presence of cystic fluid between the inner and outer layers of the enamel epithelium frequently results in the formation of follicular odontomes. The initial degenerative changes within the stellated reticulum are not usually indicative of follicular odontome formation. Teeth involved in this type of cystic formation have no Nasmyth's membrane. This seems to be an important point in discussing the etiology of these tumors.—*Mil. Surgeon*, 87:45, July 1940.

ARTHUR F. FISHER.

The Canine Fossa

By W. J. MILLINGER

IN a detailed anatomic study of the canine fossa, the findings are based on a survey of 200 skulls and numerous wet specimens. Special caution is urged in those cases in which sinus operations involving this area are undertaken, since the nerve and blood supply of the upper anterior teeth is supplied through small canals within the thin bony wall of the antrum. The arrangement

is so variable that it is impossible to estimate the extent of functional disturbance following the operation. The direction of incision in the soft tissues bears no relation to the loss of sensation in the teeth. In general, operations in this area are followed by temporary anesthesia of the upper incisors and possibly the cuspids and bicuspids. In certain instances, this disturbance of sensation may be permanent.—*Arch. Otolaryng.*, 31:930, June 1940.

J. VOLKER.

Lymphangioma of the Tongue

By J. P. RIGG and R. WALDAPFEL

LYMPHANGIOMA is a non-infectious and non-malignant lesion of the tongue. Three distinct types may be recognized: 1. The wart-shaped nodule, which may vary considerably in size and is usually found on the margin or the base of the tongue, elevated above the surface. 2. The diffuse type, which is characterized by a generalized enlargement of the entire tongue or "macroglossia." 3. The cystic type. This is extremely rare and exhibits all the characteristics of a large lymph cyst.

The prognosis is good. The therapy of choice is radical incision, if the tumor is localized, and partial surgery where more extensive involvement is found. Two cases are reported.—*Arch. Otalaryng.*, 31:966, June 1940.

J. VOLKER.

Dental Disease in the Island of Lewis

By J. D. KING

IN a survey of the oral conditions of 1,530 children of the British island of Lewis, 28.1 per cent from the rural part were free from caries, as compared with only 2.0 per cent in urban Lewis. The susceptibility to caries appeared related to developmental faults in the surface texture of the teeth, which are termed M-hypoplasia, after Mellanby. No striking differences were observed in the consumption of sweets, sugar and similar carbohydrates or in the consistency of the food consumed by rural and urban children. Neither did salivary studies of *L.acidophilus* show any significant findings.

Consequently, the in-born qualities of the teeth, as judged by their surface texture, are believed to have determined the difference in the caries susceptibility of the rural and urban children.—*Medical Research Council Report* 241, London, 1940.

R. F. SOGNNAES.

Treatment of Black Hairy Tongue

By J. WALKER TOMB

BLACK hairy tongue in man, a comparatively rare disease, is associated with the growth of certain fungi in the superficial tissues of the tongue. The author reports a case that failed to respond to internal treatments with iodide of potash or local applications of the same drug. Substitution of potassium chlorate for the iodide resulted in a cure within ten days, with no recurrence after a period of eighteen months.—*J. Trop. Med. & Hyg.*, 43:155, 1940.

J. VOLKER.

Observations on Fish's "Dead Tract" in Dentine

By M. A. RUSHTON

IT has generally been assumed that the so-called "dead tract" in the dentin which may be observed in section just below the occlusal or incisal edge is due to attrition. This preliminary report points out that it may occur also in the absence of attrition. To the author, it appears to be a natural change of the tooth with age, preparatory to attrition. The tracts are deprived of irrigation by tissue fluids and the tubuli are obliterated at the peripheral margins, the rest of the dentin as well as the pulp thus being sealed off from external injury.—*Brit. D. J.*, 68:11, January 1940.

R. F. SOGNNAES.

Chronic Endemic Fluorosis in Northern India

By C. D. MARSHALL DAY

IT has been established that a number of mottled enamel areas exist throughout Northern India. Water samples from nine wells gave a fluorine content of from 0.6 to 6.4 parts per million. All of 200 children who were natives of the examined district showed enamel mottling, of varying degrees of severity. A careful examination revealed that all children in the 5-7 age group were affected with mottling of the deciduous teeth. This finding is of considerable interest and leaves no room for doubt that the placenta is permeable to fluorine and that fluorine is excreted with the mother's milk. Mottled

enamel was found in 96.15 per cent of 3,822 permanent teeth and in 54.35 per cent of the 1,415 deciduous teeth examined.

The secondary posteruptive staining of the fluorosed teeth was not observed in the 5-7 age group, but appeared with increasing frequency in the older children. This confirms the association between dental fluorosis and dental caries.

Only 2.23 carious teeth were observed per child, and of 1,352 permanent incisor teeth, none was carious.—*Brit. D. J.*, 68:409, May 1940.

R. F. SOGNNAES.

Improving the Mastication Efficiency and Facial Esthetics in a Case of Gross Prognathism of the Upper Jaw by Means of Oral Surgery

By W. W. BRASHEARSM, W. G. EDMONDS and T. E. DREWETT

IN a man aged 40 with gross prognathism of the maxillae and advanced pyorrhea alveolaris of all teeth, extraction of all the remaining teeth and replacement with upper and lower dentures was authorized.

Accompanying the article are good photographs of the case.—*Mil. Surgeon*, 86:545, June 1940.

ARTHUR F. FISHER.

Bakteriologische Befunde bei Klinischer Aktinomykose (Bacteriologic Findings in Clinical Actinomycosis)

By H. A. GINS and ELFRIEDE PAASCH

THE study of fourteen clinical cases of suspected actinomycosis has shown that in only one case could the actinomyces be established as the only probable cause of the condition. All other cases showed a mixed anaerobic flora made up principally of oral organisms.

The histologic study of the lesions gave quite different findings. Typical glandular swelling was found in only one case. Study of the other cases was either without result or showed changes which did not fit the accepted picture.

In serologic tests, agglutination of serum occurred with *Leptothrix maxima* and *Leptothrix fragmentata*, as well as with the actinomyces.

The authors believe that infection is possibly not initiated by the presence of outside organisms, but by mobilization in the mouth of anaerobic organisms already established there.—*Zentrlbl. f. Bakt. (Orig.)*, 145:402, 1940.

HAZEL TEFFT.

Dental Hypoplasia and Caries Among the Children of Finnish Lapps

By HELEN MELLANBY

AN examination of the teeth of seventy Finnish Lapp children between 2 and 14 years showed a prevalence of hypoplasia and dental caries. Some grade of M-hypoplasia (grades 1, 2 and 3, described by May Mellanby) were found by probe examination in 73.8 per cent of the deciduous teeth and 93.3 per cent of the permanent teeth. Gross hypopasia occurred in 3.9 per cent of the permanent teeth, but none was found in the deciduous teeth.

Skulls buried for from fifty to 200 years showed much less M-hypoplasia and no gross hypoplasia. Caries was very common, 55.3 per cent of deciduous and 44.5 per cent of permanent teeth being affected. All children over 4 years had caries.

M-hypoplasia was directly correlated with caries, as the result, it was thought, of a deterioration of diet as compared with that of the children's predecessors.—*Brit. M. J.*, 1:682, April 1940.

BASIL G. BIBBY.

Adaption of Growing Rat to the Ingestion of a Constant Concentration of Fluorine in the Diet

By MARGARET LAWRENZ, H. H. MITCHELL and W. A. RUTH

IN experiments in which rats were fed fluorine in constant dosages of from 4 to 12.5 parts per million of their diet for periods of from twenty-two to thirty-four weeks, it was noted that the fluorine eliminated increased by from 60 to 100 per cent. The adaption was less marked with the higher fluorine intakes. Changes in the function of the kidney, and to a greater extent the intestine, account for the smaller retention. Striation of the teeth (mottling) occurred only in animals on diets with a higher fluorine content. The fluorine content of the teeth increased more than that of the bones with increasing flourine consumption.—*J. Nutrition*, 19:53, June 1940.

BASIL G. BIBBY.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

ALPHA OMEGA FRATERNITY, Baltimore, Md., December 29-30.

AMERICAN ACADEMY OF PERIODONTOLOGY, Cleveland, Ohio, September 5-7.

AMERICAN ACADEMY OF RESTORATIVE DENTISTRY, Cleveland, Ohio, September 7-8.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF ORAL DIAGNOSIS, October 17-18, New York, N. Y.

AMERICAN ASSOCIATION OF DENTAL EDITORS, Cleveland, Ohio, September 7.

AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTS, Cleveland, Ohio, September 8-10.

AMERICAN COLLEGE OF DENTISTS, Cleveland, Ohio, September 8.

AMERICAN CONGRESS OF PHYSICAL THERAPY, Cleveland, Ohio, September 2-6.

AMERICAN DENTAL ASSISTANTS ASSOCIATION, Cleveland, Ohio, September 9-12.

AMERICAN DENTAL ASSOCIATION, Cleveland, Ohio, September 9-13.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION, Cleveland, Ohio, September 9-13.

AMERICAN PUBLIC HEALTH ASSOCIATION, Detroit, Mich., October 8-11.

AMERICAN SOCIETY FOR THE PROMOTION OF DENTISTRY FOR CHILDREN, Cleveland, Ohio, September 9.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS, Cleveland, Ohio, September 6-7.

ASSOCIATION OF AMERICAN WOMEN DENTISTS, Cleveland, Ohio, September 9.

ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES—DENTAL SECTION, Cleveland, Ohio, September 10.

UNIVERSITY OF BUFFALO DENTAL ASSOCIATION, Buffalo, N. Y., October 8-10.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second and fourth Tuesdays in each month from October to June at the United States Public Health Service Auditorium, Washington.

GREAT LAKES ASSOCIATION OF ORTHODONTISTS, Toronto, Canada, October 28-29.

GREATER NEW YORK DENTAL MEETING, Hotel Pennsylvania, New York, December 2-6.

GREATER PHILADELPHIA ANNUAL MEETING, February 4-7, 1941.

INTERNATIONAL COLLEGE OF DENTISTS, Cleveland, Ohio, September 8.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS, Cleveland, Ohio, September 7-8.

NATIONAL DENTAL ASSOCIATION, St. Louis, Mo., August 12-16.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA, Pittsburgh, October 22-24.

PIERRE FAUCHARD ACADEMY, Cleveland, Ohio, September 9.

PSI OMEGA, Cleveland, Ohio, September 9-10.

DENTAL ALUMNI SOCIETY, University of Pennsylvania, Philadelphia, September 19.

WISCONSIN STATE DENTAL ECONOMIC STUDY CLUB, Madison, August 2-3.

STATE SOCIETIES

August

Hawaii, at Honolulu

October

Southern California, at Los Angeles

November

Florida, at St. Petersburg (11-13)
Ohio, at Cincinnati (25-27)

April (1941)

Massachusetts (14-17)

May (1941)

Georgia, at Savannah (19-21)
Illinois, at Peoria (12-15)

STATE BOARDS OF DENTAL EXAMINERS

New Jersey, December 9-14. Walter A. Wilson, 148 West State St., Trenton, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, December 10-14. Reuben E. V. Miller, 61 North Third St., Easton, Secretary.

ALPHA OMEGA FRATERNITY

THE annual convention of the Alpha Omega Fraternity will be held at the Belvedere Hotel, Baltimore, Md., December 29-31.

EMANUEL HOFFMAN, *Publicity Manager,*
827 West 36th St.,
Baltimore, Md.

AMERICAN ASSOCIATION OF DENTAL EDITORS

THE American Association of Dental Editors will hold its annual meeting in the Statler Hotel, Cleveland, Ohio, Saturday, September 7. An all-day program has been arranged and editors are urged to attend.

O. W. BRANDHORST, *Secretary,*
4952 Maryland Ave.,
St. Louis, Mo.

AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTS

THE annual meeting of the American Association of Public Health Dentists will be held in the Rose Room, Hotel Cleveland, Cleveland, Ohio, September 8-10.

F. C. CADY, *Secretary,*
U. S. Public Health Service,
Washington, D. C.

AMERICAN COLLEGE OF DENTISTS

THE Cleveland convocation of the American College of Dentists will be held in the Statler Hotel, Sunday, September 8. There will be morning, luncheon, afternoon and evening sessions.

O. W. BRANDHORST, *Secretary,*
4952 Maryland Ave.,
St. Louis, Mo.

AMERICAN CONGRESS OF PHYSICAL THERAPY

THE nineteenth annual scientific and clinical session of the American Congress of Physical Therapy will be held September 2-6, at the Hotel Statler, Cleveland, Ohio. For information concerning the seminar and preliminary program of the convention proper, address the American Congress of Physical Therapy, 30 North Michigan Ave., Chicago, Ill.

AMERICAN PUBLIC HEALTH ASSOCIATION

THE Oral Health Group of the American Public Health Association will hold its annual luncheon, October 9, at 12 m., at the Hotel Statler, Detroit, Mich. Nathan Sinai, of the University of Michigan Public Health School, will speak on "Where Is Dentistry Going in Public Health?" Members of the American Dental Association are invited to attend this luncheon meeting.

W. H. PHILLIPS, *Chairman,*
Local Arrangements Committee,
Oral Health Group.

ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES—DENTAL SECTION

A DINNER meeting of the Dental Section of the Association of Military Surgeons of the United States will be held in conjunction with the annual meeting of the American Dental Association September 10 at 6:30 p.m., Statler Hotel, Cleveland, Ohio. Delegates and representatives of all services will be present. Captain Conrad C. Gilkinson, Cleveland, is chairman of the dinner committee.

JOHN H. FREDERICK,
Major, DC, Maryland National Guard,
7 Elmhurst Road,
Baltimore, Md.

UNIVERSITY OF BUFFALO DENTAL ASSOCIATION

THE fortieth annual meeting of the University of Buffalo Dental Association will be held October 8-10, at the Hotel Statler, Buffalo, N. Y. The Eighth District Dental Society of the State of New York is cooperating in developing the program. All ethical practitioners are invited to register and to attend these sessions.

LEON J. GAUCHAT, *Publicity Chairman.*

GREAT LAKES ASSOCIATION OF ORTHODONTISTS

THE fourteenth annual meeting of the Great Lakes Association of Orthodontists will be held at the Royal York Hotel, Toronto, Canada, October 28-29.

RICHARD E. BARNES, *Secretary,*
Republic Bldg.,
Cleveland, Ohio.

INTERNATIONAL COLLEGE OF DENTISTS

THE Mid-Year Meeting of the Interna-

tional College of Dentists (U.S.A. Section) will be held in the Salle Modern, Hotel Statler, Cleveland, Ohio, Sunday, September 8, at 6 p.m.

ELMER S. BEST, *Registrar,*
801 Medical Arts Bldg.,
Minneapolis, Minn.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

THE annual meeting of the National Association of Dental Examiners will be held in Cleveland, September 7-8.

R. P. THOMAS, *Secretary,*
Heyburn Building,
Louisville, Ky.

NATIONAL DENTAL ASSOCIATION

THE National Dental Association will hold its twenty-seventh convention, August 12-16 in St. Louis, through the cooperation of the local chapter, the Mound City Dental Society. For further information, address

J. A. JACKSON, *Secretary,*
406 Commerce St.,
Charlottesville, Va.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA

THE Annual Fall Convention of the Odontological Society of Western Pennsylvania will be held in Pittsburgh at the William Penn Hotel, October 22-24.

JAMES M. MCNERNEY, *Secretary,*
8127 Jenkins Arcade,
Pittsburgh.

GREATER PHILADELPHIA ANNUAL MEETING

THE Greater Philadelphia Annual Meeting will be held February 4-7 at the Benjamin Franklin Hotel.

ABRAM COHEN, *Chairman,*
Publicity Committee,
269 South 19th St.,
Philadelphia, Pa.

PIERRE FAUCHARD ACADEMY

A MEETING of the Pierre Fauchard Academy will be held Monday, September 9 in Parlor C, Hotel Statler, Cleveland, Ohio.

ELMER S. BEST, *Secretary,*
801 Medical Arts Bldg.,
Minneapolis, Minn.

PSI OMEGA

ALL Psi Omegas attending the Eighty-Second Annual Session of the American Dental Association are invited to the dinner dance of the fraternity at the Hotel Cleveland, September 9 at 6:30. Headquarters will be at the Cleveland Hotel and members are asked to register during the session. The business meeting will be held September 10 at 10 a.m. at fraternity headquarters.

JAMES H. FERGUSON, JR.,
Grand Master, National Alumni Chapter,
Medical Arts Building,
Baltimore, Md.

GEORGIA DENTAL ASSOCIATION

THE seventy-third annual meeting of the Georgia Dental Association will be held at Savannah, May 19-21, 1941, with headquarters at the Hotel DeSoto.

R. H. MURPHY, *Secretary,*
Macon.

OHIO STATE DENTAL SOCIETY

THE next meeting of the Ohio State Dental Society will be held at the Netherland Plaza Hotel, Cincinnati, November 25-27.

VAN B. DALTON, *President,*
116 Garfield Place,
Cincinnati.

MASSACHUSETTS DENTAL SOCIETY

THE Massachusetts Dental Society will meet April 14-17, 1941.

PHILIP E. ADAMS,
106 Marlboro St.,
Boston.

ILLINOIS STATE DENTAL SOCIETY

THE next annual meeting of the Illinois State Dental Society will be held in Peoria, May 12-15, 1941. The newly elected officers are: John J. Donelan, Springfield, president; J. R. Blayney, Chicago, president elect; J. Leslie Lambert, Springfield, vice president; L. H. Jacob, Peoria, secretary, and R. W. McNulty, Chicago, treasurer.

L. H. JACOB, *Secretary,*
Jefferson Building,
Peoria.

STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY OF NEW JERSEY

THE State Board of Registration and Examination in Dentistry of New Jersey will

hold its annual examinations, commencing December 9 and continuing for five days thereafter. On application to the secretary, a copy of the requirements and rules, instruction sheet and preliminary application blank will be sent. Any person desiring to apply as a candidate must file the preliminary application blank, together with the examination fee of $25, on or before March 15 for the succeeding June examinations or before September 1 for the succeeding December examinations.

WALTER A. WILSON, *Secretary,*
148 West State St.,
Trenton.

DENTAL COUNCIL AND EXAMINING BOARD OF THE COMMONWEALTH OF PENNSYLVANIA

THE Dental Council and Examining Board of the Commonwealth of Pennsylvania will conduct examinations in Philadelphia and Pittsburgh, December 10-14. For information and application blanks, address the Department of Public Instruction, Bureau of Professional Licensing, Dental Division, Harrisburg, or

REUBEN E. V. MILLER, *Secretary,*
61 North Third St.,
Easton.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION

THE next annual meeting of the American Dental Hygienists' Association will be held in Cleveland, Ohio, September 9-13, with headquarters at the Hotel Carter.

A. REBEKAH FISK, *Secretary,*
Walter Reed Gen. Hospital,
Washington, D. C.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF ORAL DIAGNOSIS

The two-day meeting of the American Association for the advancement of Oral Diagnosis, October 17-18, in the New York Academy of Medicine Building, New York, N. Y., will come at the end of the first week of the Graduate Fortnite of the Academy. Prominent members of the dental and the medical professions will participate in the program as clinicians, essayists and discussors, covering subjects of common and practical interest to members of both professions.

A dentomedical exhibit on oral and physical diagnosis will be presented during the meeting, stressing the significance of early and correct diagnosis in the field of prevention and the importance of periodic examinations, enabling those who visit the exhibit to obtain important and practical suggestions that can be applied in the everyday practice of dentistry and medicine. Members of both professions who are in good standing in their respective organizations are eligible for membership.

For further information relative to membership, organizing of regional divisions, etc., communicate with the secretary, H. Justin Ross, 515 Madison Ave., New York, N. Y.

ASSOCIATION OF AMERICAN WOMEN DENTISTS

The Association of American Women Dentists will hold its nineteenth annual meeting in Cleveland, Ohio, September 9, at the Cleveland Hotel. The objective of this association is to promote good fellowship and cooperation among its members and to aid in the advancement of women in dentistry. An interesting program has been planned and all members are urged to attend this meeting. All women dentists who are members of the A.D.A. are cordially invited to join the Association of American Women Dentists.

TO DIRECTORS—SUPERVISORS OF DENTAL PROGRAMS:

In collaboration with the Bureau of Public Relations of the American Dental Association, the New Jersey State Department of Health will present a unique dental health education exhibit. It is proposed to collect health education material from all available sources in the United States and Canada. If this effort is successful, persons interested in dental health education programs can, in one booth, obtain a bird's-eye view of present-day efforts to disseminate authentic dental health information to the public.

Please send to J. M. Wisan, New Jersey State Department of Health, Trenton, N. J., before August 1, a list of all the material that you have on hand. Then plan to send actual copies to Cleveland. Please note that the actual material is to be sent to Dr. Wisan at the convention headquarters, Room 1241, Hotel Statler, in time to reach Cleveland Saturday, September 7.

J. LYNN MAHAFFEY, M.D.,
Director of Health.